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ABSTRACT

This manual, developed with a grant from the United States Office of Education, Office of Environmental Education, contains ten interdisciplinary environmental education teaching units developed by teachers from the state of New York for use in the secondary grades. The units are referenced to the syllabuses of New York State and are designed to supplement or supplant some of the units normally used in instructional programs. The format of this publication is designed to facilitate the duplication of subject matter segments, individual worksheets, or single units. Units are provided for consumer education, English language arts, environmental studies, fine arts, health, industrial arts, mathematics, sciences, and social studies. Learning activities within individual units contain syllabus and environmental references, objectives, procedures, related activities and resource materials. The appendices consist of: (1) a schematic of a curriculum design process; (2) categories of environmental issues; (3) environmental education instructional objectives; (4) environmental concepts defined; (5) environmental understandings; (6) an annotated list of other New York State Education Department environmental materials; and (7) a list of New York City curriculum references for the units in this manual. (BT)

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environmental education curriculum infusion units

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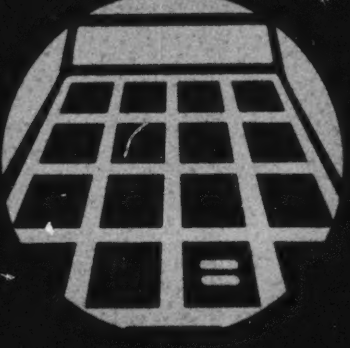
for grades 7-12



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FOREWORD

Never let it be said that life does not exact the measure of men in order that they and their heirs may live it well and usefully. However, the way we now live our lives has raised serious questions concerning our ability to guarantee useful, productive, and equally, if not more rewarding, lives for those who will follow us. For, in striving to continually improve our quality of life, we frequently equate this better life with the development and acquisition of material goods and creature comforts, which process seldom guarantees a critical analysis of the consequences of our actions. We often overlook the fact that our natural environment is a closed system which must be protected in order that it might replenish itself, and in so doing, us. In fact, there are elements within this system which, for all practical purposes, are not replenishable, or renewable. If we consume and abuse without caution beyond this capacity for replacement, and exhaust that which is not renewable, we foreclose many options otherwise available to succeeding generations.

The wisdom of our daily actions is recorded indelibly upon our natural surroundings. The mechanics of government, the rise and fall of the economy, energy politics, and individual actions in the name of the individual all exact an incredible toll upon the very system which supports us. It is all too clear that the attitudes, values, and behavior widely exhibited in society today generally lack the enlightenment and foresight that will be required to weigh present actions in terms of future consequences.

Granted, environmentalists, educators, and citizens have much to be proud of in terms of their achievements vis a vis the increased public awareness of the environment and the impact of our encroachments upon it. Much has been done through legislative action and individual initiative in redressing some of the wrongs we have perpetrated upon the natural environment, especially since the first Earth Day in 1970. However, more remains to be accomplished than is possible or wise to hope for if we react to environmental problems only at such time as they approach crisis proportions.

Education has an enormous responsibility for generating environmental awareness in society as well as for enlightening those among us of another generation who may have some predetermined and faulty notions about how society and the environment interact. Our commitment, then, must be to make the best use of the educational resources available to us, in order that young people, as they leave the educational system and become decision-making adults, may be adequately prepared to assess their actions in terms of what constitutes the "good life" and how it may be achieved and maintained for the greatest number of people. This of course requires that people be equipped with the information and basic analytical skills necessary to consider life holistically... that the interdependence of actions and their consequences, as they pertain to the natural as well as the manmade environment, must be recognized, understood, and dealt with.

This instructional supplement is a manifestation of the beliefs stated above and, as such, is provided as a practical means by which educators may effectuate their commitment. The Federal grant which made the publication possible was directed by Barry W. Jamason, who has also planned and developed all of the Department's environmental education publications.

VIVIENNE N. ANDERSON
Assistant Commissioner
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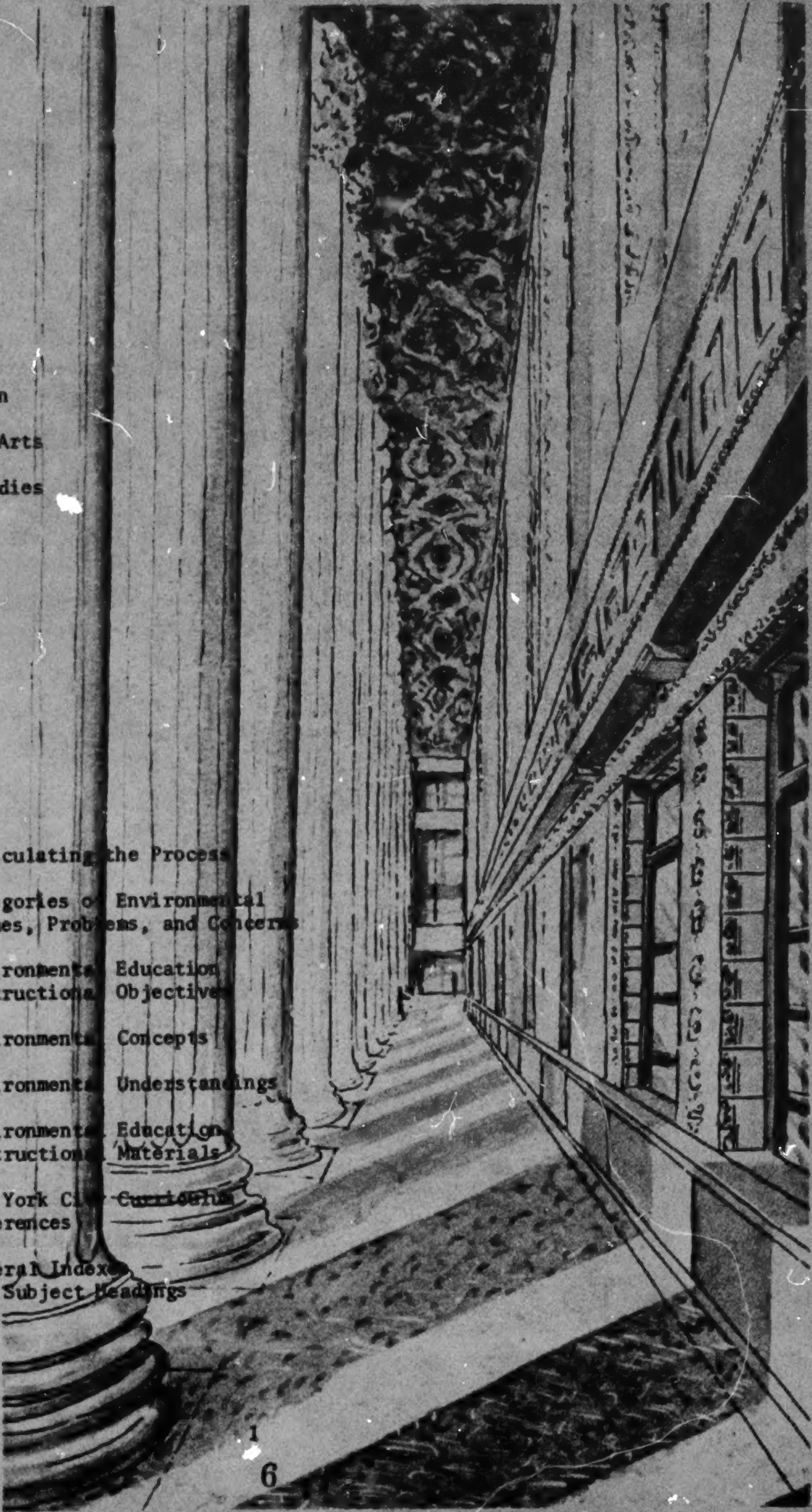


INTRODUCTION

This instructional supplement is an attempt to blaze a trail through the bewildering mass of approaches, information, and resources which have arranged themselves around the problem of society's environmental condition. A great number of educators are concerned with environmental problems, but many either do not see a viable connection between these problems and their instructional programs, or they do, but they are uncertain as to what is the most practical method for incorporating such concerns into daily instruction.

As a beginning, it would be appropriate to consider that environmental education is:

- a new approach to teaching and learning about man's relationship to his environment: how he affects, and is affected by, the world around him
- an integrated educational process dealing with man's natural and manmade surroundings
- experience-based learning, using the total human, natural and physical resources of the school and surrounding community as an educational laboratory
- an interdisciplinary approach that relates all subjects to a whole-earth "oneness of purpose"
- directed toward "survival" in a technological society
- life-centered and oriented toward community development
- an approach for developing self-reliance in responsible, motivated members of society
- a rational process for improving the quality of life
- geared toward developing behavior patterns that will endure throughout life.

Therefore, understanding what environmental education is and what it can do, we must recognize the setting or the operative conditions in the world today:

- dynamic populations with their concomitant, increasing need
- inescapable disruption of (natural) ecosystems (e.g., technological intrusion on the environment)
- unequal distribution of resources and population

- failure of individuals to relate environmental misuse and deterioration to personal lifestyles, choices, and individual actions

- slowness of government to recognize the imperative for environmental planning and management

- society's inability to grasp the significance of the return likely to be realized on its current, poor investment in environmental concern

- the environmental condition as a mirror of society's values.

Given these conditions, and with environmental education as the tool, it is imperative that we should:

- examine the dynamics of population

  -Are we considering all of the effects of, and the alternatives to, our present rates of economic and population growth?

- plan more widely so as to limit the degree to which we disrupt ecosystems

- consider the gap between the "haves" and the "have nots"

  -Does the United States unwittingly establish unattainable standards (economic, etc.) which other nations must of necessity emulate to an increasing degree of frustration?

- reorganize our institutions and resources to deal with the causes of environmental problems rather than ineffectually grappling with their symptoms

- educate society to act less precipitously and with more concern for consequences

- recognize that values are, to a degree, culturally prescribed and may thus be culturally revised

- realize that the knowledge, skills, and attitudes we purvey in most of our classrooms relate to our natural and manmade surroundings and bear a significant relationship to the problems we perceive in our environment.

One optimistic conclusion might be that society is capable of assessing its own limitations, potential, and needs, and thus requires only a suitable, meaningful context in which to do so; and that this context is education.

It follows then that the major goal of environmental education should be to promote effective participation in the social processes which will prevent continued environmental degradation while furthering the means of improving the quality of life. To accomplish this, individuals must be educated to understand the need for effective participation in the social processes which affect life through an awareness of environmental problems and to understand the consequences of not finding solutions for these problems.

If we accept the above as a rationale, the task remains to reduce the problem of incorporating environmental education objectives to its simplest terms. If we continue to "take time out" from the everyday instructional program to deal with environmental problems, they will remain adjunct concerns. On the other hand, if we prepare a program of instruction which is customized with, or has environmental objectives built in, our attention to such concerns will be as regular and automatic as the societal occurrence of the problems themselves.

The units in this manual were developed by teachers from five school districts in the State who participated in the Department's Federally funded environmental resource materials project. The units represent examples of the application of the process which is described in Designing an Environmental Curriculum... A Process, a related Department publication developed under the auspices of the same grant.

Since the units are referenced to the syllabuses and tied to the content implicit therein, they may be used either to supplement or supplant some of the units normally used in the instructional program. In this way, both the regular subject matter objectives and environmental objectives may be satisfied.

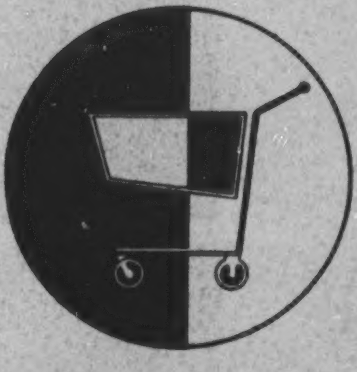
The format of this publication is designed to facilitate the duplication of subject matter segments, individual worksheets and art work, charts, reference materials, or single units if so desired. Further, the three-ring margin and looseleaf organization will permit practical, lesson-planning use of the materials, and it will afford the opportunity to insert additional units which will be provided by the Department or developed locally.

The Appendices consist of: a schematic of the curriculum design process referred to above; categories of environmental issues; environmental education instructional objectives; environmental concepts defined; environmental understandings; an annotated list of other New York State Education Department environmental materials; and a list of New York City curriculum references for the units in this manual.

environmental education curriculum infusion units

consumer education

for grades 7-12



The activities that follow are referenced to the Department publication, Consumer Education... Materials for an Elective Course. The activities are nongraded and thus may be considered as an environmental supplement to consumer education. Special attention should be directed to Coping With the Problems of a Technological Age, Part I and Part II, which constitute a module in the series, *Expanded Programs of Consumer Education*. The understandings and activities in those two booklets offer the instructor further opportunity and direction for dealing with the problems of energy, resources, scarcity, and pollution.

CONSUMER EDUCATION

Budgeting Environmentally

SYLLABUS REFERENCE: Consumer Education; *Purchasing Food, Clothing, Furniture, and Appliances*, pp. 35-46; *Budgeting and Money Management*, pp. 103-114.

ENVIRONMENTAL REFERENCES:
Energy: Fuel supplies
Transportation: Mass transit
Consumerism: Consumer information

OBJECTIVES:

- To relate housing to such environmental considerations as location, size, design, age, and construction materials
- To consider the environmental impact of several factors related to clothing: quantity of clothing purchased, variety of styles, cost, durability, maintenance, and sources of materials
- To examine the environmental cost of appliances
- To analyze food selection with regard to health and nutrition and such environmental factors as: where and how foods are grown; how they are transported; type of packaging; and waste disposal
- To consider transportation in terms of efficiency and environmental impact

PROCEDURES:

1 Distribute budget forms with appropriate categories given in terms of absolute dollars and percent of income. Discuss. A sample form follows.

Budget and Record of Expenses for March 1976

Money available______ Money spent______ = Difference (+ or -)______

Item	Amount Budgeted	Weeks				Total Amount Spent	Percent of Income
		1st	2nd	3d	4th		

The following entries should be made in the "Item" column: food; housing; household operation (heat, light); clothing; transportation; health care; recreation and entertainment; contributions; savings; miscellaneous expenses; total.

2 Establish the following committees to conduct research and report to the class.

Housing Committee:

(1) Discuss the following questions:

- What percent of income can reasonably be devoted to housing?
- What is the space requirement for a family of a given size?
- What should be the relationship between interior and exterior space?
- What factors contribute to efficient design?
- What should be considered in selecting construction materials? (cost, availability, durability, accessibility, renewability, efficiency, environmental impact)
- How should housing be located in relation to shopping areas, industry, transportation, and required services?
- Maintenance: once the house is constructed, what will be the cost and efficiency of maintenance?

(2) Arrange for students to visit a building materials supplier and to secure information about availability, cost, and expected life of structural materials used in their area.

(3) Ask students to consult real estate and property rental ads in the newspaper for cost comparisons in various neighborhoods.

(4) Have students consult building contractors on costs per unit area for both new and older homes in a given area.

(5) Contact a local historical society to learn about the types and location of historical architecture in the area. If possible, invite a speaker to discuss restoration and/or remodeling of older homes.

Clothing Committee:

(1) Relate each of the following to its impact on the environment:

- practicality, fashion, fad, durability, versatility
- natural vs. artificial fabrics

- initial cost vs. true cost based upon length of use
- laundering and dry cleaning considerations

(2) Gather information on the sources of fabrics used in making garments.

(3) Collect a variety of garment labels and compare them for information concerning washability, shrinkage, wrinkle-proofing, and fabric characteristics.

(4) Ask a sampling of students in the class to keep a record for a week of clothing changes required of them and to chart the results. Include school clothing; clothes for special athletic activities such as tennis, swimming, baseball; "dress up" clothes for attending places of worship, etc.

Food Committee:

(1) Discuss the following questions:

- What are the basic elements of a nutritionally sound diet?
- How do supply and demand affect food prices?
- How do the geographic distribution of food and food production capacity compare with population distribution?

(2) Conduct an interview at a health food store concerning quality, sources, methods of production, and cost of the foods sold there.

(3) Plan a weekly menu for a family. Include nutritional value, cost, and environmental impact wherever applicable.

(4) Compare food preserving techniques and costs. Include a cost analysis for home canned food vs. prepared foods.

Transportation Committee:

(1) Discuss the following questions:

- How does the cost per mile of road building and maintenance compare with the cost of developing mass transit systems?
- How do travel and commutation costs in European and Canadian city centers compare with those in your local area?... in the United States as a whole?
- How does the cost to the individual for private transportation compare with the cost of traveling by mass transit?

(2) Keep a record of financial and environmental costs of running a personal vehicle for two weeks and compare it to the financial and environmental costs of using mass transportation for a similar period.

Appliance Committee.

(1) Using the following chart, have each student keep a record of his family's daily use of several household appliances and chart the cost, projecting it over one year. Discuss how one might reduce, within reason, the use of appliances, thereby effecting savings in money and energy. (The costs on the chart may need updating.)

APPLIANCE	WATTAGE	HOURS USED PER DAY
bedroom lamp		
television		
toaster		
radio		

(Add as many applicances to this list as are used in the home.)

	Annual (Typical) Energy Consumption (kilowatt-hours)	Annual Cost of Energy Consumed*
Air conditioner	2000	$ 50.00
Electric blanket	150	3.75
Can opener	0.3	.01
Clock	17	.43
Clothes dryer	1200	30.00
Coffee maker	100	2.50
Dishwasher (with heater)	350	8.75
Fan (attic)	270	6.75
Fan (furnace)	480	12.00
Fluorescent light (3 fixtures)	260	6.50
Food freezer (16 cu. ft.)	1200	30.00
Food mixer	10	.25
Food waste disposer	30	.75
Frying pan	240	6.00
Hair dryer	15	.38
Hot plate (2 burner)	100	2.50
Iron (hand)	150	3.75
Light bulbs	1870	46.75
Radio (solid state)	20	.50
Radio phonograph (solid state)	40	1.00
Range	1550	38.75
Refrigerator (frost-free, 12 cu. ft.)	750	18.75
Sewing machine	10	.25
Shaver	0.6	.02
Television (black/white)	400	10.00
Television (color)	540	13.50
Toaster	50	1.00
Vacuum cleaner	45	1.13
Washer (automatic)	100	2.50
Totals	11,938 kw.-hrs.	$281.72

*Cost of electricity = 2 1/2 cents per kilowatt-hour.

RELATED QUESTIONS AND ACTIVITIES:

- Prepare a map of the community showing: (1) industry and other major sources of employment; (2) existing and developing housing sites; (3) mass transit connecting housing and jobs.
- Design a housing project based on the above considerations.
- Build a model of an energy-saving house utilizing alternate energy sources such as wind, solar, or biodegrading energy.

RESOURCE MATERIALS:

Hertzberg, Ruth, et al. Putting Food By: The Best-Complete-of Old and New Ways to Preserve Food Right with Recipes for Using It. Brattleboro, Vt.: Greene, Stephen Press, 1972.

Lappe, Frances M. Diet for a Small Planet. Westminster, Md.: Ballantine (Division of Random House), 1972.

CONSUMER EDUCATION

Consumer Purchasing

SYLLABUS REFERENCE: Consumer Education; *General Principles of Consumer Purchasing*, What Makes Us Buy Goods?, pp. 6-7; Our Demand For Goods Is Stimulated By:, pp. 7-11; *Purchasing And Maintaining An Automobile*, pp. 47-64.

ENVIRONMENTAL REFERENCE: Consumerism: Consumer information

OBJECTIVES:

- To recognize that choices between essential needs and nonessential desires are often in conflict
- To recognize that the rate of resource consumption increases in direct proportion to the expansion of our wants, needs, and markets
- To recognize and evaluate the role of advertising in consumer purchasing
- To recognize a need to be well informed about the best ways to manage and conserve our energy supplies

PROCEDURES:

1 Almost half the population of the United States is under 21 years of age. As consumers, many of these young people are likely to exercise poor judgment in purchasing due to a lack of experience in the marketplace. Frequently, this

faulty judgment is caused by failure to discriminate between necessities and luxuries, and by the influence of advertising on the purchases made.

Have a class committee conduct a survey of the class to determine which common consumer goods they consider necessary (essentials, or needs) and which seem to be simply desirable (nonessentials, or wants). Consider the following:

- Are needs the same for all students? Why? Can the members of the class agree on what is necessary? Why may this be difficult to do?

- Are there any students who consider some items essential while a majority of the class disagree? If so, what are their reasons for these choices?

- Once a list of essentials is generally agreed upon, ask students to consider the list as though they were young consumers in a developing nation such as India or Nigeria. Would any of the essentials now be considered nonessential? Why, or why not?

- If people in developing nations were to define essential and nonessential the way we do in America (and had the wherewithal to pursue these desires in the marketplace), what would be the effect on world resources?

- Have students name several nonessential consumer items they anticipate purchasing during the next 12 months. How would their lives be changed if they didn't buy them?

2 Have the class develop a list of ways that producers, through advertising, attempt to convince consumers that nonessentials are indispensable to them. The list should be supported by newspaper and magazine clippings. In the discussion that follows, ask students:

- What are some examples of how you have been swayed by the power of advertising?

- Did you realize that you very often advertise products for a retailer or a manufacturer? Some examples of this are: labels in clothing, shopping bags that you carry away from the store, or a dealer's name permanently affixed to the automobile you buy. What are other examples?

- Should manufacturers and retailers get this type of free advertising? Can you do anything about it if you object?

- What are some of our scarce resources which are further diminished by successful advertising campaigns for more modern products, greater "convenience" in packaging, and other "technological innovations?"

- What are some ways in which the power of the advertising industry might act more constructively in terms of our resource and energy problems? Is it likely that they will change their approach? Explain.

3 Consumption is continually being increased and a large part of the increase is a result of the producer's ability to create wants. This expansion of production in turn increases the rate of resource use.

In connection with this stimulation of artificial "need," have the students categorize products by the following types of advertising appeals:

- -emotional
- -logical
- -creative (humorous, artistic)
- -testimonial
- -psychological

Ask students to:

- Identify explicitly each commercial or advertisement to which they refer.
- Show how business has created needs in areas where no need existed 25 years ago... 50 years ago... 75 years ago.
- Use economic statistics to show actual growth in the areas selected for the question above.
- Identify the areas of growth chosen as examples of renewable or nonrenewable resources. Explain if necessary.

4 People should carefully distinguish between transportation needs and transportation desires when they purchase automobiles, since both economic and environmental considerations are involved.

Involve the class in a comparative automobile shopping survey by having students learn to consider all the significant factors that such a potential expenditure represents. Have students select a luxury, a standard, an intermediate, a compact, and a subcompact from each of the four United States manufacturers, and include one manufacturer who exports to this country. Compare each model (25 in all) for base price, options, maintenance requirements, frequency of repair records, gas consumption, and resale value. The information can be obtained from dealers, consumer and auto magazines, and the Blue Book (for resale value). When the survey has been completed, discuss the following.

- People often buy what others want or what others want them to buy. Do you agree or disagree with this statement? Justify your answer.

- What is the relationship between each of the following pairs of factors:

  -size and cost
  -size and gas consumption
  -options and gas consumption
  -frequency of repair and options
  -cost of maintenance and size

- Are autos, whichever type one purchases, used efficiently? Explain, considering the efficacy of car pools and improved public transportation in light of the recent oil shortage.

- Do dealers' statements on performance differ from test results as reported by consumer and trade magazines? Give details.

- What factors will be most important in helping you decide which car to buy?

- What environmental problems are created by the automobile? Which can be solved by diligent effort, and which may never be remedied?

- Can we continue to justify the production of 10 million autos a year? Explain.

RELATED ACTIVITIES:

- Tape segments of radio or TV commercials that students feel are particularly compelling and discuss what makes them appealing.

- Advertisers use a variety of techniques in their appeals to consumers. Some of the more common ones are listed below. Once students have become familiar with the types, ask them to select an example of each from magazines, radio, or TV. This activity lends itself to either an individual or class exercise.

  basic ad - a straightforward approach that encourages purchase of a product by giving facts about it

  celebrity ad - encourages purchase of the product because it is used by a famous person

  the new and improved ad - encourages purchase of a product because it has been improved by additives

  research ads - encourages purchase of a product because statistics have proven its value or acceptability

  senses ad - encourages purchase of a product by appealing to one or more of the five senses

  youth ads - encourages purchase of a product by appealing to youth and to older people who want to feel young and to keep up with the times family ad - encourages purchase of a product by showing a happy family using it

romantic ad - encourages purchase of a product by suggesting use of it will increase popularity with the opposite sex

environmental ad - encourages purchase of a product because it is not harmful to the environment

popularity ad - encourages purchase of a product because everybody else uses it

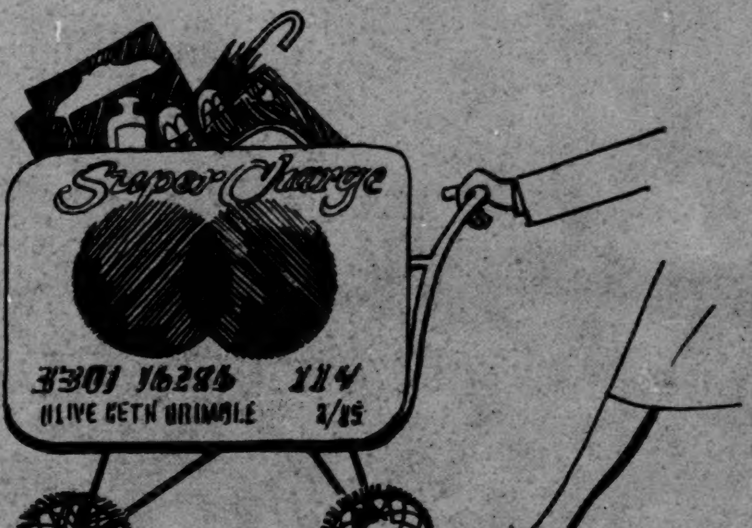
expert ad - encourages purchase of a product because an expert recommends it

nostalgia ad - encourages purchase of a product because it suggests a return of the "good old days"

humor ad - ads that provoke laughter are apt to be remembered and it is hoped that products will also be remembered

RESOURCE MATERIALS:

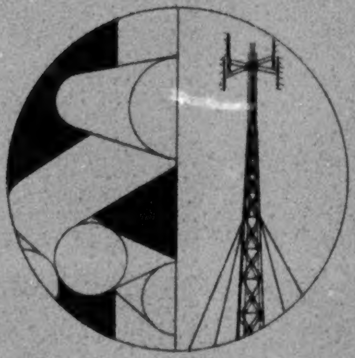
Citizens' Advisory Committee on Environmental Quality. *Citizen Action Guide to Energy Conservation*. Washington: Government Printing Office, 1973.



environmental education curriculum infusion units

language arts

for grades 7-12



Man Interacts With His Environment

SYLLABUS REFERENCE: Literature, Listening/Speaking, and Composition, as cited, refer to strands in English Language Arts.

ENVIRONMENTAL REFERENCE: Natural Environments: Survival

OBJECTIVES:

- To make students aware of man's basic problems in coping with his environment
- To develop an understanding of man's ability or inability to adapt to his surroundings

PROCEDURES:

1 Read Jack London's "To Build A Fire" to the class, or provide class time for students to read it independently. Discuss the following.

- What is the effect the author wishes to achieve and how does he achieve it? (Literature, pp. 119-121)
- Why was the man unable to cope with his environment?
- What could he have done to insure his survival in that environment?
- How and why is the dog able to survive in the same environment?
- The story seems to imply that instinct is superior to reason. Defend the opposite point of view. Is man really the master of his environment? How and why do others survive this kind of situation, even though this particular man failed?

2 Assign the short story "Antaeus," by Borden Deal, for silent reading during a class period. Discuss the questions below.

- In the story, how is dirt (soil) made to seem clean, while the destruction of a garden is a "dirty" thing to do?
- Why do the adults and the boys see the soil and grass differently?
- How were the young people in this story trying to cope with their environment?
- Why did T.J. run away and head south?
- In a sense, both the man in "To Build A Fire" and the boys in "Antaeus" failed. Did they fail for the same reasons? Explain. What is similar or dissimilar about their situations?
- In what ways could your own neighborhood be improved by a concerted effort of teenagers?

3 Provide students with the poem below and select from the related activities for class work.

A Man Said to the Universe

A man said to the universe:
"Sir, I exist."
"However," replied the universe,
"The fact has not created in me
A sense of obligation."

Stephen Crane

- State the theme of the poem. (Literature, pp. 132-133)
- What attitude of Man is reflected in the line, "Sir, I exist."? If you were reading the poem aloud, how would you read that line?
- What attitude is revealed by the reply of the Universe?
- Why are the lines as short as they are?
- Show the theme of the poem in visual form. Draw a cartoon or picture. Or, draw a two-panel cartoon, one for the Man's statement, and one for the Universe's reply.
- Discuss how the theme of the poem is related to the environment. (Listening/Speaking, pp. 107-116)
- Define paradox, and explain how it functions in the poem. (Composition, pp. 71-72)

RELATED ACTIVITIES:

Because literature has always had as one of its basic themes man's confrontation with the natural world, the reading of good literature is one of the easiest ways to effect student involvement in current environmental issues.

Many short stories are concerned with environmental problems, regardless of the original thematic intents of the authors or even the differing environments in which they lived and wrote. In addition to the two stories treated in this lesson, countless others like them can be found which show the contrast between the wilderness setting and that of the urban scene.

- The teacher should be encouraged to use whatever literature is available to pursue this topic should students show sufficient interest. For example:

Books

Alone. Richard E. Byrd
Annapurna. Maurice Herzog
Call of the Wild. Jack London
Cruel Sea, The. Nicholas Monsarrat
Dangerous Air. Lucy Kavaler
Endurance. Alfred Lansing
Kon Tike. Thor Heyerdahl
Let the Hurricane Roar. Rose Wilder Lane
Man Who Refused to Die, The. Barry Wynne
Man Against the Sea. Nordhoff and Hall
Raft, The. Robert Trumbull
Silent Spring, The. Rachel Carson
Silent World. Jacques Cousteau
Storm. Mary Stewart
We Seven. Scott Carpenter and astronauts
Wind, Sand and Stars. Antoine de St. Exupery

Short Selections

"Climbing the Kloochman." William O. Douglas. (In *Worlds of People*. American Book Co.)
"High Victory." David Lavender. (In *Reading Roundup*. D.C. Heath Co.)
"Invaders from the Sky." Joel Raleigh. (In *Wide Wide World*. Scott, Foresman)
"Last March, The." Robert Scott. (In *Adventures in Reading*, Harcourt, Brace, Jovanovich)
"Man said to the Universe" (Poem). Stephen Crane.
"My Life in the Frozen North." Peter Freuchen. (In *Worlds to Explore*. Ginn and Co.)
"Open Boat, The." Stephen Crane. (In *Contemporary Literature*, Scribners)
"The Sloburbs." Joseph Wood Krutch. (In *Forms of Literature*. Holt, Rinehart, and Winston).
"To the Summit of Everest." Sir Edmund Hillary. (In *Man Against Nature*. Charles Neider. Harper and Row)
"Trapped in the Desert." Gary Beeman. (In *Adventures for Americans*. Harcourt, Brace, Jovanovich)

- Compare London's tale with stories which deal with a certain effect (stories by Edgar Allan Poe, Bret Harte, Ambrose Bierce, for example). (*Literature*, pp. 119-121)

- Obtain pictures which establish a particular setting such as that in "To Build A Fire" and write a word picture of each. (Composition, pp. 69-70)

- In a paragraph demonstrate that self-preservation is the theme of this story. (*Literature*, pp. 132-133; *Composition*, pp. 70-71)

- Do an "execution" of the theme of the story. It can be done in the form of a letter, a story, a musical motif, a collage, a geometric figure, a ballet, a puppet show or dramatization, a platform reading, charades, or a mock TV program.

- Do a dramatic monologue of the story, from the point of view of the man. (*Listening/Speaking*, pp. 108-116; *Composition*, pp. 70-71)

- Write a paragraph to explain one way in which man daily manages in his environment. (Composition, pp. 62-72)

- Report on films on the theme of man vs. the environment. (Listening/Speaking, pp. 108-116)

- Create a Fox Fire-like book which shows various careers that have something to do with the environment. Each picture should have a few sentences to describe the career. (Composition, pp. 69-70)

- Write a composition which indicates the individual's responsibility toward the environment. (Composition, pp. 69-70)

- Write a letter to the local paper which supports or opposes the creation of a park, or a new factory, or a new highway, in the area.

- Write a summary of the items which appear in the local paper that are environmentally oriented. (Composition, pp. 69-70)

- Write a composition which describes how the environment, and our role in it, would change if the temperature remained below freezing throughout the year. (Composition, pp. 69-71)

- Report on the major sources of energy in your community. (Composition, p. 71)

- Select several poems which have as their subject the seasons of the year. "Winter Branches" by Margaret Widdemer and "Spring" by Richard Hovey are examples. (To get a more complete listing, see Granger's Index to Poetry.) Discuss, after reading, the changes of seasons as they are reflected in the poems. Questions such as the following may be answered.

  - How does the environment appear different during each of these seasons as discussed in each poem? Are these true pictures of the environment? Explain.
  - What physical changes can be brought about by man during these various seasons discussed in the poems which would be reflected in the environment?
  - Find a picture which relates to the environment as reflected in one of the poems. Mount pictures and poems together for a visual presentation in class.

RESOURCE MATERIALS:

Deal, Borden. "Antaeus." Designs in Fiction. New York: Macmillan, 1968.

London, Jack. "To Build A Fire." Short Stories of Jack London. New York: Funk and Wagnalls Co., 1968.

ENGLISH LANGUAGE ARTS (9)

Pollution and Propaganda

SYLLABUS REFERENCE: English Language Arts: Composition Section K-12; *Organization and Development 7-9*, Organize by Deduction and Induction, pp. 69-71.

ENVIRONMENTAL REFERENCES: Pollution, Air, Engine emission
Energy: Power generation, Fuel supplies

OBJECTIVES:

- To recognize propaganda and understand it for what it is
- To develop an ability to analyze magazine and newspaper articles on environmental concerns

PROCEDURES:

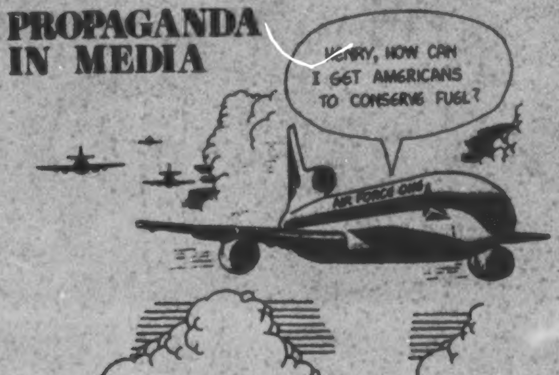
This unit is designed to augment regular classroom activity dealing with propaganda, rhetoric, and the news media. Continuous analysis of environmental concerns appearing in magazines and local newspapers is encouraged.

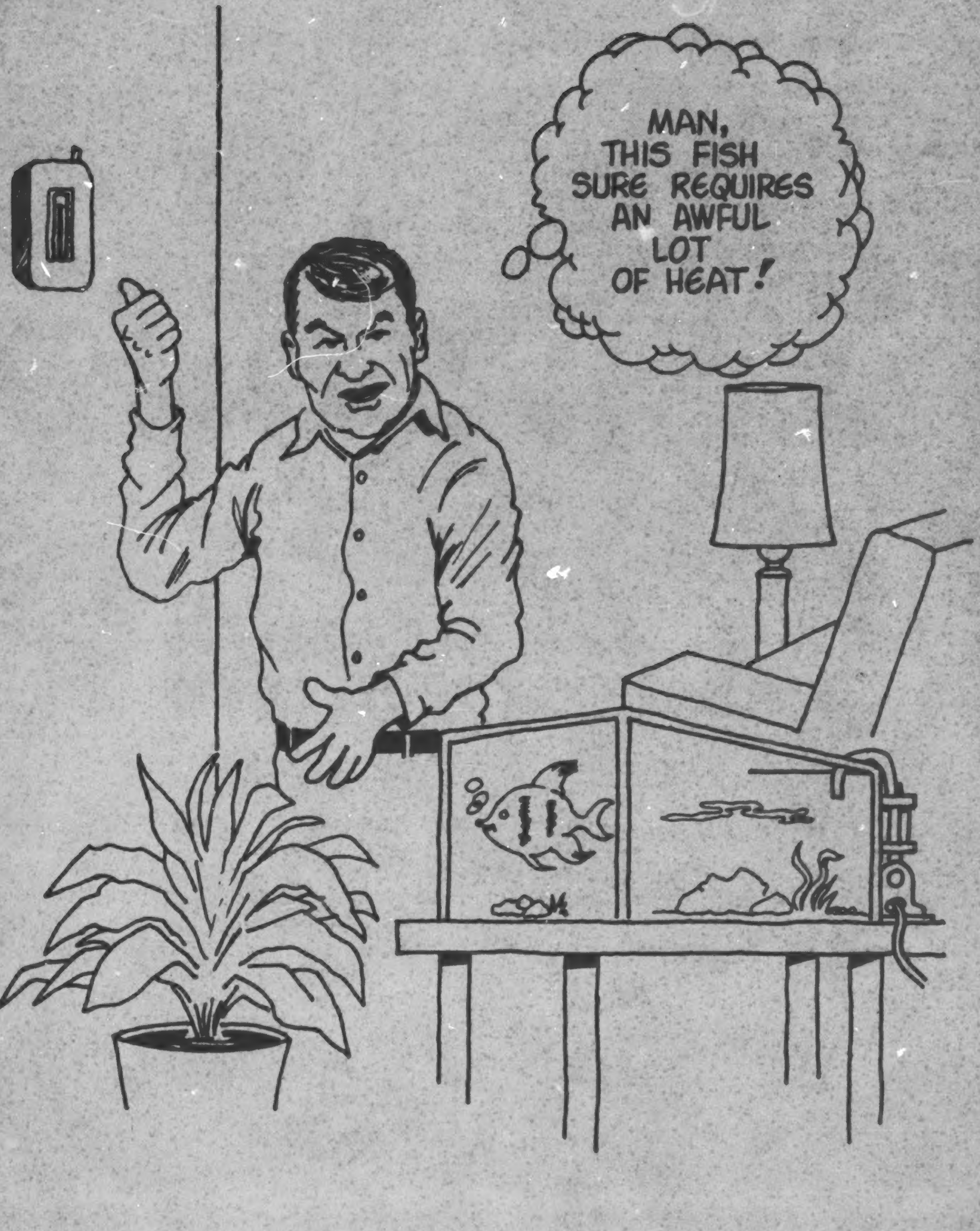
1 Using the editorial page from the local newspaper as an example, direct students to write a logical composition suitable for use as:

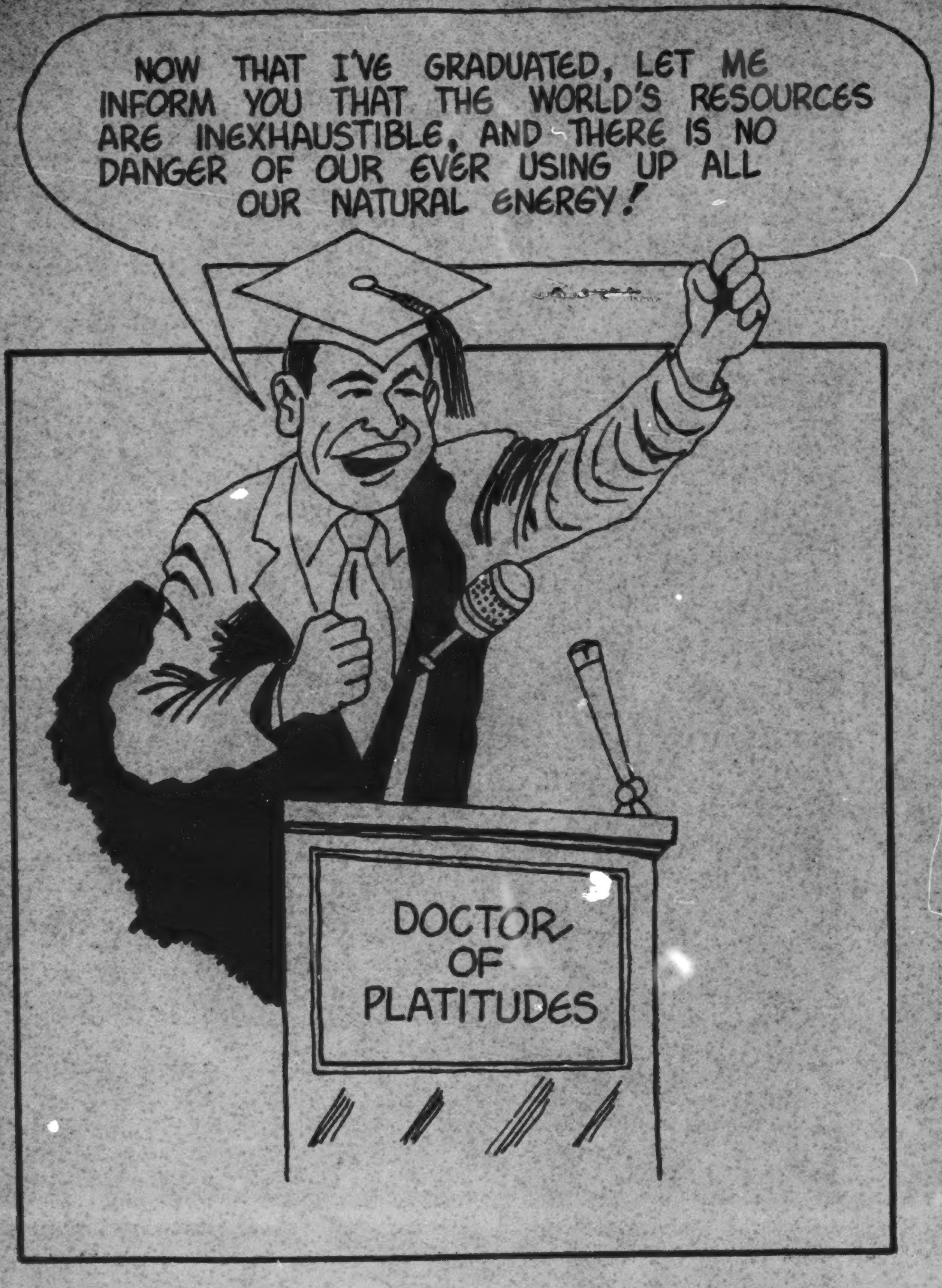
-a local editorial
-a national column
-a letter to the editor

Artistically talented students may wish to draw an editorial cartoon depicting an environmental problem of local concern.

2 Analyze and write an evaluation of the cartoons which follow to determine what is wrong with either the reasoning or the behavior of the people involved. Indicating what sort of propaganda is used, draw or write your own version of what the situation should be.


PROPAGANDA IN MEDIA
HENRY, HOW CAN I GET AMERICANS TO CONSERVE FUEL?
AIR FORCE ONE


MAN, THIS FISH SURE REQUIRES AN AWFUL LOT OF HEAT!


NOW THAT I'VE GRADUATED, LET ME INFORM YOU THAT THE WORLD'S RESOURCES ARE INEXHAUSTIBLE, AND THERE IS NO DANGER OF OUR EVER USING UP ALL OUR NATURAL ENERGY!
DOCTOR OF PLATITUDES

3 Select from the news media statements relating to environmental problems that contain propaganda and false logic. Guide students in reducing them to syllogistic form, criticizing premises and conclusions both for form and fact.

4 Have students read together, as a classroom activity, articles in the environmental section of *Time*. Reduce the articles to syllogistic form, and discuss the arguments presented with emphasis upon logical solutions.

5 Analyze newspaper articles and editorials dealing with environmental pollution.

RELATED ACTIVITIES:

- Construct an enlarged editorial page using the editorials, letters, and cartoons created by the students. Display it in a prominent location in the school for all students to read.

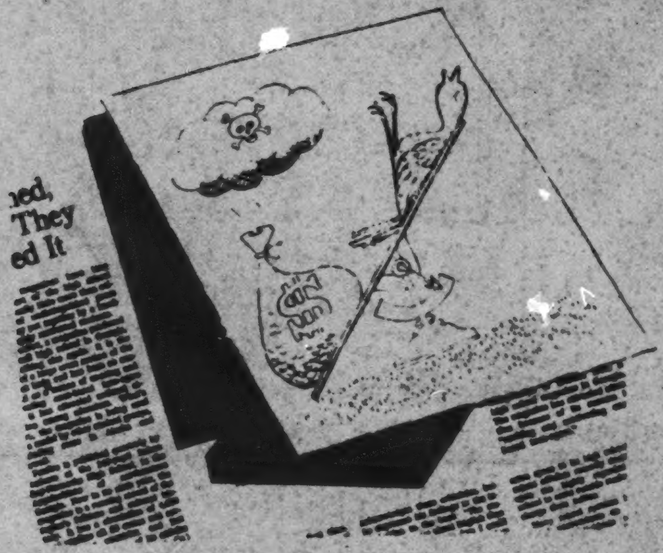
- Direct students in the following composition activity:

    -Write a syllogism with the following conclusion: Therefore, Americans should conserve their natural resources.
    -Expand your syllogism into a magazine article urging citizens to conserve energy.
    -Rewrite your magazine article as a speech to be delivered in your school auditorium asking students to be more aware of energy waste within the school.

RESOURCE MATERIALS:

Chase, Stuart. *Guides to Straight Thinking*. New York: Harper and Row, 1956.

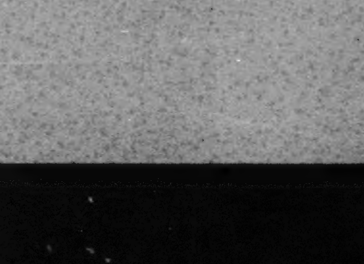
Theuless, Robert H. *How to Think Straight*. New York: Hart Publishing Company, 1939.



environmental education curriculum infusion units

environmental studies

for grades 7-12



ENVIRONMENTAL STUDIES (9-12)

Overpopulation: A Drain on Resources

SYLLABUS REFERENCE: Science 7, 8, 9, Block C, Living Things Around Us; *III. Ecology*, pp. 38-48. Science 7, 8, 9, Block D, Our Microenvironment; *IV. Microbes and Disease*, pp. 18-26. Social Studies, Grade 9: Asian and African Culture Studies; *Topics 2 and 3, Africa South of the Sahara: Land and People*, pp. 14-30. (Environmental Studies is not a prescribed course of study; thus, there is no syllabus. Useful curriculum references from other subject areas are provided.)

ENVIRONMENTAL REFERENCE: Population: Growth rate, Distribution and density, mobility, migration

OBJECTIVES:

- To analyze population from a demographical viewpoint leading to a description of its nature and properties
- To develop an understanding of the sociological and ecological consequences of the population explosion

PROCEDURES:

1 Environmental education provides a unique opportunity to study the interrelationships that exist among a number of subject areas. The nature of the problems revealed during an ecological study of population leads in turn to consideration of the sociological implications of the same problems. Opportunity is therefore provided for the student to experience science as an interdisciplinary process, rather than as a rigidly defined, limited body of knowledge.

This unit is developed along two parallel lines of study. The nature and characteristics of population are incorporated into a series of formal classroom lessons. Collateral activities carried out by the students involve group research directed toward the development of an understanding of the nature of the forces that interact to give a population its identity.

Play a tape-recorded reading of Jonathan Swift's essay, "A Modest Proposal." Discuss the essay, using such questions as:

- What was your reaction when you heard Swift's proposal for utilizing the surplus children of Dublin?
- Was Swift's proposal sincere? Explain.

- When do you think this essay was written? Upon what did you base your answer?

- How does this essay dramatize a serious problem of the time?

- Is overpopulation only a contemporary problem? Explain.

2 Conduct a series of classroom experiences designed to develop appropriate demographic principles.

- What is a population?

    -What are the measurable characteristics of a population?

- What is population density?

    -How do we distinguish between crude and ecological density?
    -What information do we get from a comparison of population densities?

- What factors determine population density?

    -What are the effects of natality, mortality, and movement on population density?

- How do we study population change?

    -What is the nature of demographic data?
    -How do we use demographic data to study population change?

- What is the population problem?

    -What is the history of human population growth?
    -How have science and technology influenced population growth?
    -What is the significance of the doubling time of a population?*

- What factors influence population size?

    -How do biotic potential and environmental resistance interact?
    -How are food and space limiting factors?

- What is population dispersion?

    -What are the patterns of dispersion?
    -What is the survival value of dispersion?
    -What are the dynamics of dispersion? (immigration, emigration, migration)
    -How does dispersion contribute to social organization?
    -How does dispersion contribute to territoriality?

- How did the Black Death affect the population of Europe?

    -Devise a mapping exercise to follow the spread of bubonic plague.
    -Devise a graphing exercise to interpret the effects of the plague.

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*(See the MATHEMATICS 11 unit, Formula for Growth, beginning on p. 75.)

3 To satisfy the second objective of the unit, analysis of the problems resulting from the population explosion, design a research topic for student investigation. Divide the class into a number of committees, each of which is responsible for presenting its findings to the class. Encourage students to utilize appropriate audiovisual materials to increase interest in the presentation of their reports. A suggested topic and activities follow.

Topic: Famous Migrations in History

- Trace the route of some famous mass migrations in history (e.g., Tartars, Romans, Eastern Europeans). Prepare a large display map to illustrate the findings.
    - -What factors (political, social, environmental) contributed to these migrations?
- Describe the history and underlying causes which led to the Negro emigration to America and migration in America after the Civil War.
    - -How does the Negro migration to America differ from the migrations of other groups of people?
    - -Trace on a map the patterns of Negro mobility within the United States after the Civil War.
    - -How have these patterns changed since World War II?
    - -Identify on a map the present areas of Negro concentration in the United States.
    - -What have been the consequences of such major shifts in the Negro population density?
    - -What forms of social organization developed among Negro populations in different sections of the country?
- Prepare a map of New York City (or Albany, or Rochester, etc.) showing major ethnic concentrations based on census data of 1900 and 1970.
    - -What were the social forces which contributed to such ethnic concentrations?
    - -What kinds of problems resulted from such ethnic concentrations within the city?
    - -How were these problems dealt with?
    - -What forms of social organization emerged from such ethnic concentrations?

4 Following presentation of the committee reports, conduct a seminar on related questions such as those which follow. Have students support their contributions with clippings from newspapers, magazines, and journals.

- What are the effects of urban overcrowding on personality, mental health, and crime?

- What kinds of social behavior would you expect to find in areas of high population density? Low population density? Are expectations of social behavior predictable on the basis of population density? Cite examples.

  -Can we apply ecological principles to the solution of population-related problems?
  -Why is population growing so rapidly now compared to the past?
  -What are the effects on population size of our dependency on industrial technology?
  -How have scientific advances influenced population growth?

- Is man subject to the same biological constraints that regulate populations of other living things? Support your answer.

- How does the human population explosion affect populations of other living things?

- Conduct a school-wide census of the number of children in each family of the pupils in the school. Relate the findings to the population laboratory done previously.

RELATED ACTIVITIES:

- Upon completion of the unit, discuss the following questions.

  -Do we have an inalienable right to have an unlimited number of children? Justify your response.
  -What are the consequences of the increase in human life expectancy as a result of improved sanitary and medical practices?
  -What obligations and responsibilities do the developed and developing nations have regarding population growth?
  -What are the ethical, moral, and political considerations for dispensing aid to nations whose resources fail to keep pace with population growth?
  -Should decisions on abortion and birth control be left to the individuals concerned, or should they be decided on the basis of national policy? Explain.

- Publish a Population Newsletter for distribution to the grade.

- Prepare a corridor display on a population-related theme.

- Write and produce a play or conduct a panel discussion for video tape or an assembly on the theme, The Population Explosion.

- Develop a questionnaire to survey beliefs and attitudes about the population crisis. Distribute the questionnaire within the class and to other classes in the school. Compare opinions expressed by the class with those of other classes. What noticeable differences are there, if any? How do you account for this?

RESOURCE MATERIALS:

Horsley, Kathryn, et al. Options: A Study Guide to Population and the American Future. Washington,D.C.: Population Reference Bureau, 1973.

Horsley, Kathryn, et al. Environment and Population: A Source Book for Teachers. Washington, D.C.: National Education Association, 1972.

"The Human Population," Scientific American, September 1974.

Meadows, Donella H., et al. The Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind. New York: Universe Books, 1972.

ENVIRONMENTAL STUDIES (9-12)

Energy and Food Shortages

SYLLABUS REFERENCES: Science 7, 8, 9, Block C, Living Things Around Us; *III. Ecology*, pp. 38-48. Science 7, 8, 9, Block D, Our Microenvironment; *IV. Microbes and Disease*, pp. 18-26. Social Studies, Grade 9: Asian and African Culture Studies; *Topics 2 and 3, Africa South of the Sahara: Land and People*, pp. 14-30. (Environmental Studies is not a prescribed course of study; thus, there is not a syllabus. Useful curriculum references from other subject areas are provided.)

ENVIRONMENTAL REFERENCE: Energy: Fuel supplies

OBJECTIVES:

- To create an awareness of the ecological importance of energy
- To develop an awareness that we are part of a world-wide continuum, with our affluence on one end and the destitution of the world's "have nots" on the other
- To examine the pros and cons of suggested alternate sources of energy
- To stimulate consideration of modified lifestyles for us as individuals and as a nation in a world facing shortages of food and energy

PROCEDURES:

1 The concept of energy is fundamental to science education at the secondary school level. Much of the effort devoted to the study of energy, however, takes the form of "energy

at work." Such a hard science approach fails to consider another aspect of the subject which has become a major topic of concern to a society overwhelmed by shortages of fuel and food. In this unit, interest in energy transcends traditional science course work and is broadened to include socially significant problems.

Two parallel lines of study characterize the unit. Classwork in formal ecology emphasizes the biological aspects of energy as it flows through the ecosystem. A series of collateral activities engages the students in group research directed toward an understanding of the implications to humanity of the topic. Part of this work involves the student in independent research outside the classroom; part occurs in the classroom as student reports and open-ended discussions of the problems of supplying food and energy to the world.

Conduct a series of classroom lessons, including laboratory activities where applicable, designed to create an awareness of the ecological importance of the concept of energy.

- Why is energy important to life?

  -What is the origin of energy in the ecosystem?
  -How do living things utilize energy?

- How does energy enter the ecosystem?

  -What is the nature of light?
  -What is the history of man's understanding of photosynthesis?

- How does photosynthesis take place?

  -What are the requirements for photosynthesis?
  -What is the photosynthetic equation?

- How does energy flow through the ecosystem?

  -What are producers and consumers?
  -What is a pyramid of energy?

- How are food chains related to each other?

  -What is a food web?
  -How are organisms in a food web dependent upon each other?

- What are the major chemical components of the environment?

  -What are the characteristics of a bio-geo-chemical cycle?
  -What are the major bio-geo-chemical cycles?
  -How are organisms interrelated with the physical environment?

2 Set up small committees to conduct independent research on some of the major questions that evolve from the study of energy, photosynthesis, and food production. Encourage students to find interesting ways of presenting their reports by utilizing overhead transparencies, audio-cassettes, large multi-colored display charts, graphs, data tables, and photographs. Two examples follow.

Topic I: Food or Famine

- Produce a map showing the major food producing areas of the world. Key the map to show:

  -the principal crops of these areas
  -which areas have food surpluses
  -which areas have food shortages

- How do technological factors (economy, fertilizer, transportation) influence the production of food?

- How do government policies influence world food supply?

- How do cultural practices influence world food supply?

- What is the "Green Revolution?" (Report on the work of Dr. Norman Borlaug, who won the Nobel Peace Prize in 1970 for his efforts to improve world production of wheat and rice.)

- How would a prolonged oil shortage affect world food production?

Topic II: The Energy Crisis

- Prepare a map showing the major coal and oil producing areas of the world.

- How long can we rely on our supplies of coal and oil at the present rate of consumption?

- Outline the history of the petroleum industry in this country since the discovery of oil in the nineteenth century.

- What alternate sources of energy are there? Describe the use and availability of solar, nuclear, hydroelectric, wind, tidal, and geothermal energy.

- Are they practical alternatives to oil? Explain.

- Are they capable of adding significantly to our energy supply? If so, how?

- What technical and ecological problems must be solved before we can take advantage of these alternatives?

- What would be the effects on the environment if we use alternate sources of energy?

- How has man resolved his disputes over energy and resources in the past? Give specific examples.
- How can the United States become independent of foreign sources of oil in the future?
- What are the arguments for and against strip mining?
- What should be the role of local, state, and Federal governments in the growing controversy over strip mining?

3 Concurrent with the committee reports, conduct open-ended discussions of related topics.

- Do you think underdeveloped and starving nations of the world will sit by forever, content to watch their children die of hunger, while the more fortunate nations, such as the United States, live in surplus? Justify your answer.
- Do you think the people of the more fortunate nations have the moral strength to change gluttonous habits and share some of their bounty with the rest of the world? Why, or why not?
- What is the responsibility of the "have" nations of the world during a period of crisis?
- What must the "have not" nations do to help themselves alleviate food and energy shortages?
- With the knowledge that energy is lost as a food chain is lengthened, what practical steps could be taken to alleviate the food shortage?
- What difficulties would you expect to encounter if efforts were made to change a nation's feeding habits?
- What role should schools play in an attempt to overcome a food shortage?
- Should governmental intervention take priority over private enterprise in efforts to provide adequate food and energy? Explain.
- Can you balance the long-range damage to the ecosystem via strip-mining against the immediate need for large quantities of coal? Explain.
- Are we justified in limiting offshore drilling for oil in order to preserve the ecology of coastal waters in view of our expanding need for oil? Give reasons for your position.
- With a limited supply of food, should the United States assist all needy nations to the limit of available resources, or should our aid be restricted to friendly nations? Justify your response.

- What are the ethical, moral, and political questions to be considered in distributing food to needy nations?

RELATED ACTIVITIES:

- Reinforce the idea that environmental education is a contemporary, relevant discipline concerned with today's problems by having students compile their own texts as the unit progresses. Incorporate class notes, teacher-prepared materials, and information gathered from newspapers, magazines, and other journals.

- Involve the students in an evaluation of the unit by inviting their response to such questions as:

  -Do you believe the shortages of food and energy are serious enough to warrant intensive study of the problems involved? Explain.
  -Do open-ended discussion and independent research outside the classroom provide sufficient opportunities for finding answers to such difficult problems? Support your answer.
  -To what extent, if any, should the class become directly involved in an attempt to aid people in "have not" nations?
  -To what extent, if any, should the class attempt to influence government leaders in efforts to cope with the food and energy crisis?
  -Do you think we have overestimated the ability of society and technology to provide adequate amounts of food and energy for the world's population? Upon what do you base your opinion?
  -Prepare a videotape, or assembly program if videotape facilities are not available, discussing the interrelationships between an expanding population and diminishing supplies of food and fuel.
  -Prepare factsheets on population, food, and fuel for distribution to other classes in the school.
  -Publish a periodic newsletter on environmental problems for distribution throughout the school.

RESOURCE MATERIALS:

Brehman, Thomas R. Environmental Demonstrations, Experiments and Projects for Secondary Schools. West Nyack, N.Y.: Parker Publishing Co., 1973.

Cycles. 14 min. color. Association-Sterling Films, 866 Third Avenue, New York, N.Y. 10022.

Emmel, Thomas C. An Introduction to Ecology and Population Biology. New York: W.W. Norton & Co., 1973.

Environmental Education Instructional Activities, (7-12). Albany, N.Y.: The University of the State of New York. The State Education Department.

Handbook of Environmental Education Strategies. Albany, N.Y. The University of the State of New York. The State Education Department.

Lorbeer, George C., Ed. *Circle of the World: Readings in Ecology*, Vol. I. New York: Benziger, 1971.

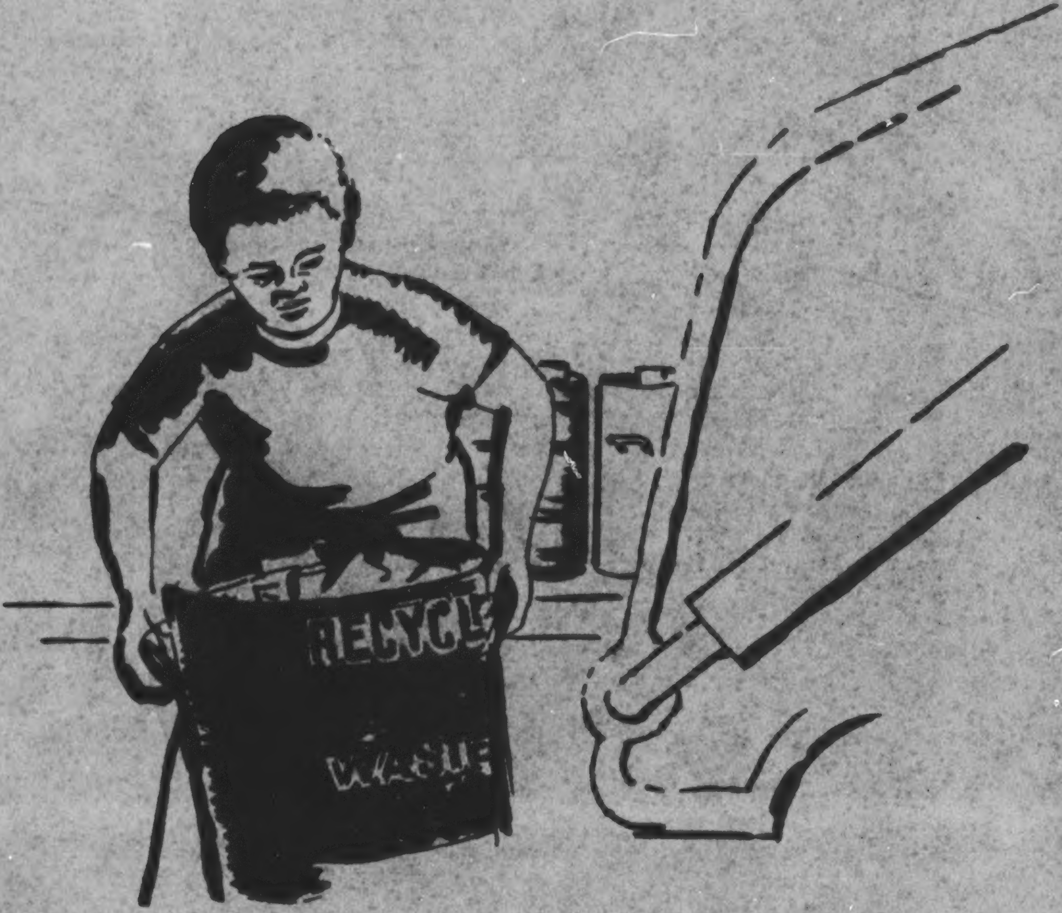
Nature's Way, Part I: The Inland Pond. 14 min. color. Richardson Wildlife Sanctuary, Inc., 64 West Road-Duane Acres, Chesterton, Indiana 46304.

Strip Mine Reclamation. 17 min. color. Tennessee Valley Authority, Film Services (Information Office), Knoxville, Tennessee 37902.

Three E's. 28 min. color. Exxon Corporation, Public Affairs Department, 1251 Avenue of the Americas, New York, N.Y. 10020.

Undersea Oasis. 29 min. color. Shell Film Library, 1433 Sadlier Circle, West Drive, Indianapolis, Indiana 46239.

Web of Life: The Endless Chain. 28 min. color. U.S. Atomic Energy Commission, Federal Building, 26 Federal Plaza, New York, N.Y. 10007.

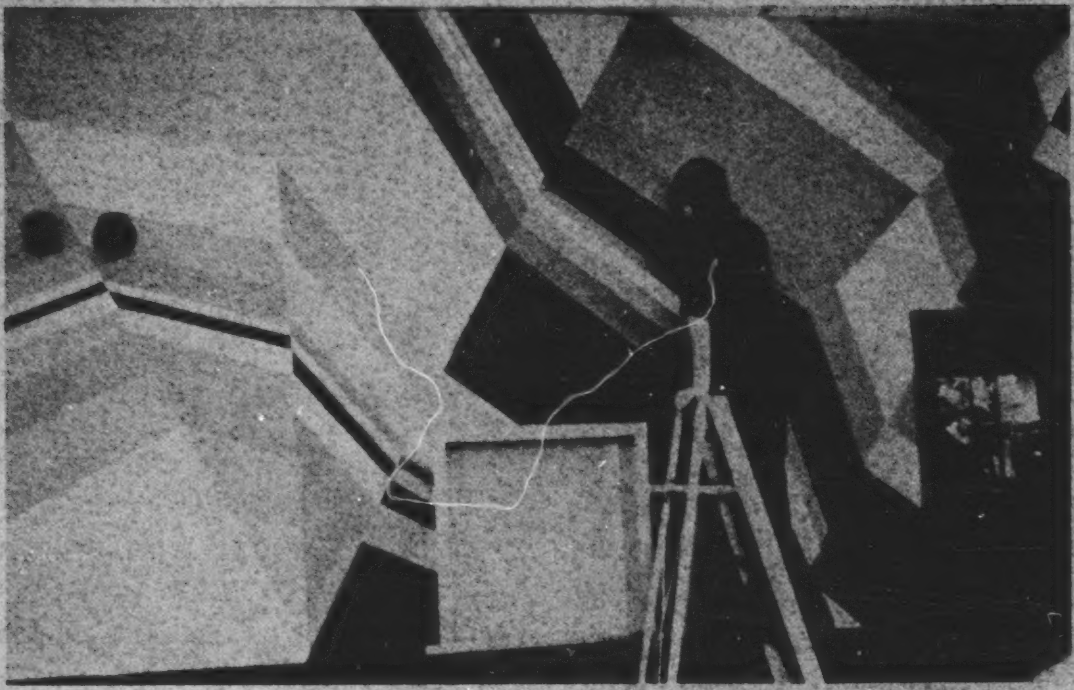


environmental education curriculum infusion units

fine arts

for grades 7-12

Student Murals: A Constructive Answer to Graffiti



SYLLABUS REFERENCE: Studio in Drawing and Painting, Graphics, Photography, Volume one, pp. 18-21; Studio in Art, pp. 17-36.

ENVIRONMENTAL REFERENCES: Pollution: Visual/Aesthetic, Graffiti
Economic/Social/Cultural Environments:
Aesthetics

OBJECTIVES:

- To provide students with a constructive medium for leaving a positive, tangible imprint on their environment
- To utilize mural painting as a means of transforming the impersonal institutional atmosphere of a school into an enjoyable environment for students, faculty, and visitors
- To explore how man has traditionally used mural paintings as a means of self-expression and of decorating his environment
- To stimulate students to apply creatively their understanding of harmonious design, color, and utilization of space
- To consider how mural painting can be used constructively in the home and in the community

PROCEDURES:

If mural painting has never been attempted within your school system, administrative approval should be sought before starting a mural program. Examples of successful school wall decoration could help persuade an administrator to endorse such a student project. (See School Arts for examples.) It would be helpful to confer with the administrator several months before the project begins. Finally, student designs for the murals should be shown to the school administrator to obtain full approval for the project.

1 Use slides, or take a trip to a local art museum, to furnish students with a general knowledge of the history of mural paintings from prehistoric cave painting to contemporary building decorating. Discuss the following:

- What were the purposes of these murals within their historical context?
- What methods of applying paints were used?
- What different methods were used to deal with space?
- What role does space play as an element of art?

2 Discuss with students the possibility of painting a mural in the school. Form subgroups to plan and execute the murals.

- What would be the most desirable location for the mural(s)?
- What theme(s) would best express the students' ideas, ideals, and aspirations?

3 Once permission from school authorities has been granted, and the murals selected, work may begin. Consider the following.

Mural Design Process:

After individual mural sketches have been discussed and approved, color schemes should be resolved. If a wall is a dark color, a few primer coats may be necessary. Complex figurative designs must be enlarged for transfer onto a wall. If an overhead transparency of the design is made, the projected and enlarged image can be transferred to brown kraft paper. Afterward, a compass or needle can be used to puncture holes at one-inch intervals along the contour of each form, simulating the Renaissance method of pouncing. At this point, students can tape the paper images to the wall and transfer them by pressing a waterproof, felt tip pen into each puncture mark. Once all dots are connected, only a line drawing of the mural design remains. Occasionally, paper transfers can be eliminated if a mural can be projected directly onto the wall. Such a transfer is impossible in a stairwell or on an upper wall.

Painting Process: Material and Equipment

Ladders should be obtained at the outset. A cart could be used as a means of transporting and storing paint. Plastic containers (e.g., refrigerator dishes, margarine containers, or others) are used for various colors, tints, and shades. Acrylic enamel paint and acrylic brushes are employed for the execution of the mural. (If the surface were primed with acrylic gesso, the water soluble acrylic paints which are normally found in senior high schools would work equally well and might be easier to handle.) Newspapers or a drop cloth should be set down before the actual painting begins.

Method:

Large areas of upper walls should be painted first to minimize dripping. An even application of acrylic paint is important. Let painted surfaces dry thoroughly before applying additional coats, since a paint brush pulled through a tacky surface can create undesirable streaks. In the case of a hard-edge or geometrical design, students may find it helpful to use masking tape to maintain or control a straight edge. A thin coat of matte medium applied along the edge of masking tape will prevent paint from seeping under the tape. Even though acrylic paints are being used, brushes not in use should be kept in water.

RELATED ACTIVITIES:

- Discuss whether or not young people can constructively transform their environment and find avenues for personal expression which will benefit their community.

- Discuss how valid it is to look to the past for the solutions to contemporary problems.

- Search the community for attempts to camouflage the exterior of deteriorated buildings and construction sites with colorful, uplifting, and aesthetically pleasing designs.

- Discuss how students can extend mural painting to game rooms at home, billboards, youth centers, and other parts of their own community.

RESOURCE MATERIALS

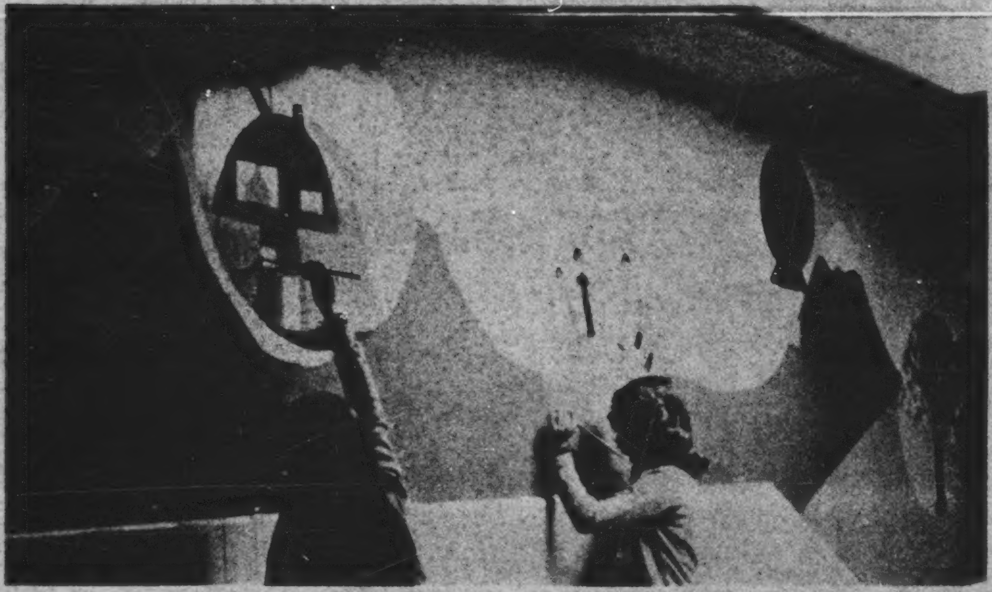
Bollen, S.K. "Mural: The Whole Is Equal to Its Parts," School Arts, November 1974, pp. 20-21.

Hayden, H. "Walls Have Tongues: Student Murals on Walls of School Buildings," P.T.A. Magazine, March 1972, pp. 12-17.

Kuziora, C. "Mural Painting," School Arts, April 1974, pp. 34-35.

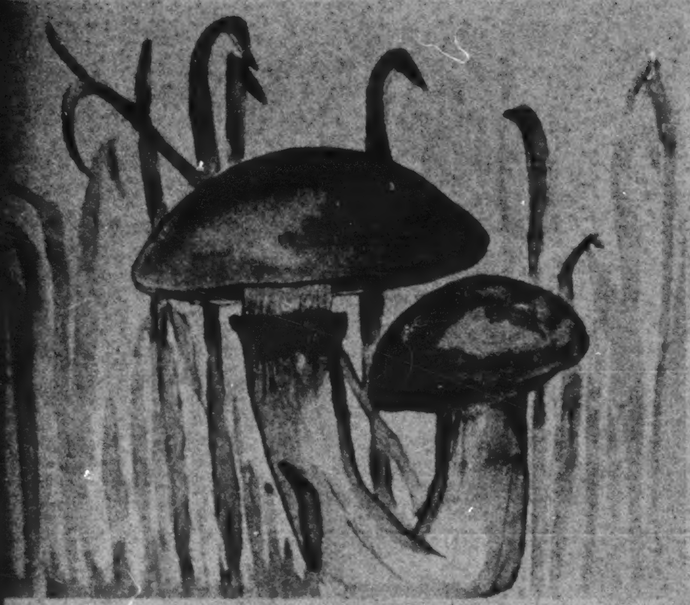
Mauk, V.C. "Twenty-Two Murals," School Arts, June 1972, pp. 24-25.

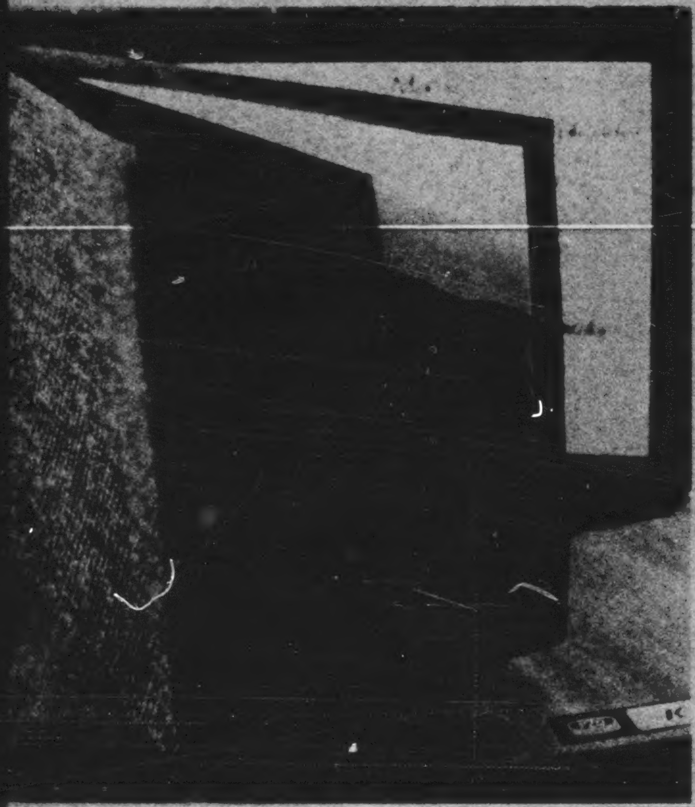
Robertson, J. and D. Curtis. "Making a Mural," School Arts, March 1973, pp. 24-25.



FINE ARTS (10-12)

Art, Poetry, and Nature





SYLLABUS REFERENCE: Studio in Drawing and Painting, Graphics, Photography, Volume One, pp. 2-7.

ENVIRONMENTAL REFERENCE: Economic/Social/Cultural Environments: Aesthetics

OBJECTIVES:

- To heighten students' sensitivity to the beauty of nature
- To record students' reactions to nature in a folio of illustrations of nature poetry
- To utilize an aesthetic experience with nature to reinforce students' concern for the preservation of their environment

PROCEDURES:

1 Introduce the project to students 2 to 3 weeks prior to the beginning of the actual work to provide time for decisionmaking about the activity each student prefers. Motivate student interest in producing a folio of illustrated poetry. Any poetic style (lyrics, Haiku, free verse) may be used. Encourage any student who wishes to illustrate his own poetry to do so.

2 Before involving students in developing their own illustrations, provide time for the class to view or listen to great works of art inspired by nature. In addition to the following, consult with language arts and music teachers for suggestions.

- Art
    - -17th century Dutch landscape painters:
      Jan Van Goyen, Salomon Van Ruysdael, Jacob Van Ruysdael, Meindert Hobbema
    - -Hudson River School of Painters:
      Thomas Cole, Frederic Church, Asher B. Durand
    - -Late 19th century American landscape painters:
      Winslow Homer, George Inness
    - -French Barbizon School (19th century):
      Theodore Rousseau, Jean Francois Millett, Camille Corot
    - -French realist (19th century):
      Gustave Courbet
    - -French impressionists:
      Camille Pissaro, Claude Monet, Alfred Sisley
- Poetry (recordings)
    - -Robert Frost
    - -William Wordsworth
    - -Henry Wadsworth Longfellow
- Music (recordings)
    - -Smetana - "The Moldau"
    - -Resphigi - "Pines of Rome"
    - -Debussy - "La Mer"

3 Develop a workshop for students to explore various media used in illustrations and lettering. Include the following:

- watercolors - review color harmonies
- pen and ink - review line and texture
- mixed media - review pen and ink on dry or wet wash
- lettering - review procedure for using and caring for pen nibs

4 Assist students in the preparation of their own books or folios. The following steps might be used.

- Step 1: Select poem(s) to be illustrated. Assist students by discussing with them some of the ideas to be illustrated. Attempt to evoke an intimate rapport with nature by suggesting some poetic views such as the following:

  -ominous and turbulent skies
  -pastoral settings
  -autumn's palette
  -a crane silhouetted against the early morning mist
  -a quiet reverie before a still reflecting pool
  -a delicate roadside columbine
  -the intricate tracery of a snowflake crystal
  -a red cardinal on a winter morn
  -the first crocus in spring
  -fields of daisies

- Step 2: Have students explore techniques to be used for illustrating and lettering.
- Step 3: Give weekly assignments which involve students working directly from nature.
- Step 4: Encourage students to examine some illustrated books inspired by nature to understand better the problems of layout. Suggest that students use the school library, local library, and bookstores for the research.
- Step 5: Have students determine the actual book or folio formats they want, and work with them on the mechanics involved. Limit project to five or six illustrations.
- Step 6: Ask students to select the lettering style they consider suitable for their project.
- Step 7: Have students develop preliminary illustrations into final images to complement the poems. Mechanical problems with the media should be solved through consultation.

RELATED ACTIVITIES:

- Upon completion of the projects, discuss the following with the students.

  -How has your view of nature and sensitivity to nature changed?
  -Are you more interested in preserving the beauty you discovered in nature? If so, how will you become directly involved in attempts to preserve the natural environment in your locality?
  -What personal sacrifices are you willing to make for preservation of the environment?

- Visit a book publisher or illustrator in your locality to observe techniques and methods.

- Attempt to influence and inspire other students by displaying books and folios in a centrally located area of the school.

- This project may be adapted to include areas such as printmaking and photography.

RESOURCE MATERIALS:

Bevlin, Marjorie Elliot. Design Through Discovery. New York: Holt, Rinehart and Winston, 1970. (Chapters 1, 2, and 14).

Blake, Peter. God's Own Junkyard. New York: Holt, Rinehart and Winston, 1964.

Brommer, Gerald. Drawing: Ideas, Materials and Techniques. Worcester, MA: Davis Publications, Inc., 1972.

Flexner, James Thomas. The World of Winslow Homer - 1836-1910. New York: Time-Life Books, 1966. (pp. 122-133).

George, Ross F. Speedball Textbook for Pen and Brush Lettering. Longbeach, N.Y.: Landau Book Co., Inc., 1965.

Klemlin, Diana. The Illustrated Book: Its Art and Craft. New York: Crown Publishers, Inc., 1970.

Sausmarez, Maurice De. Basic Design: The Dynamics of Visual Form. New York: Reinhold, 1964.

FINE ARTS (9-12)

Experimenting With Light and Sound to Create an Aesthetically Pleasing Environment

SYLLABUS REFERENCE: Studio in Art, pp. 18-20.

ENVIRONMENTAL REFERENCE: Economic/Social/Cultural Environments: Aesthetics

OBJECTIVES:

- To investigate the use of light in improving the aesthetic quality of the environment
- To encourage students to become part of a created environment by experimenting with light and sound

PROCEDURES:

1 Invite students to discuss their knowledge of black light on fluorescent surfaces. Discuss the visual kinetics of a strobe light.

- Ask students to share impressions of rock productions, like Jesus Christ Superstar, which use interesting lighting effects.
- Ask students to share whatever experiences they have had with lighting arrangements to produce special effects.

2 Use basic visual media equipment available through the school's media center to review principles of color harmony and to demonstrate how students can create their own color transparencies. An example follows.

Half-fill a glass dish, such as a pie plate, with a mixture of four parts water, one part vegetable oil, and a few drops of food coloring. Place a smaller glass dish, with the mixture added, inside the larger. Place both on an overhead projector and project on a screen or wall. Rhythmic moving of the top dish creates air bubbles and water movement. Done to music, this can create a pleasing effect.

3 Direct students to explore techniques for obtaining surrealistic effects using slides and an automatic slide projector. Discuss the following.

- How can changing the order of the slides affect the mood created?
- How can focusing be used to achieve unusual effects?
- How can the slide projector and the overhead projector be used in combination?

4 Encourage students to prepare their own light show to which other schoolmates can be invited. In addition to slides and transparencies, students may want to prepare black light posters and use folded white bed sheets as backdrop. Every effort should be made to achieve maximum experimentation and creativity. The students should create their own environment. Allow for audience participation, such as singing and dancing.

1. Have one student take the responsibility for signing out all media equipment on the day of the light show.

2. Be aware of possible overloading of electrical circuits.

3. Persons with epilepsy should not be exposed to strobe lights.

5 Working together, ask students to list the ways in which light can be more aesthetically used in the environment.

RELATED ACTIVITIES:

- Upon completion of the light experiments, discuss the following with students:

  -Did you learn to alter or change your environment effectively? How?
  -Has your perception of color in the environment changed significantly? In what ways?
  -Did you enjoy working collectively with other students toward this end? Explain.
  -Can you link the changing effects of the light show to your immediate environment at night, such as the surrealistic juxtaposition of images, neon signs, window reflections, billboards, or theater marquees? Elaborate.

RESOURCE MATERIALS:

Abrahamson, T. "Lights That Match the Elegance of a Civic Center: Amarillo, Texas," American City, April 1970, p. 128.

Kraft, M. "Bright Ideas in Lighting," Good Housekeeping, January 1971, pp. 96-101.

"Lighting for Beauty and for Service," Parks and Recreation, May 1971, p. 41.

environmental education curriculum infusion units

health

for grades 7-12

Recreation, Environment, and Health

SYLLABUS REFERENCE: Health, Strand IV Environmental and Community Health, Ecology and Health, Grades 7, 8, and 9; *I. Ecology: Its Development*, pp. 1-3.

ENVIRONMENTAL REFERENCE: Health: Recreation and environment

OBJECTIVES:

- To help students develop an appreciation of the value of recreation for individual and community health
- To determine the opportunities for active and passive recreation in the community
- To determine whether the existing recreational facilities meet the community's needs

PROCEDURES:

1 Ask students to read: "Our Guide to the Best Sports for Your Health." (See Resource Materials.) Discuss the following questions:

- What is recreation?
- How are sports beneficial to an individual's health?
- What is the value of active recreational pursuits in today's society?
- What hazards are inherent in some recreational pursuits?
- What relationships exist between recreation, health, and the environment?

2 Ask students to list the recreational activities in which they personally engage. Classify these activities as: (a) active or spectator; (b) school related or nonschool related; (c) activities that can be pursued upon completion of school. When lists are complete, rank order the activities according to participation and to the priority which students assign each. Discuss.

- How may each of the most frequently mentioned sports activities affect the health and safety of society and of the individual?
- How may each interrelate with the condition of the environment?

3 Survey community agencies such as local government, community centers, settlement houses, "Y's," religious centers, etc., to determine the location, size, and type of recreational facilities available in the community. Using these data, map their locations. List the recreational opportunities available, classifying them as active or passive.

4 Have students develop a questionnaire for the community to determine: (a) involvement in each recreational pursuit; and (b) projected involvement if additional facilities were available.

COMMUNITY RECREATION SURVEY

Name: ______________________________ Sex: M _____ F _____

Age Group: under 15 _____; 15-24 _____; 25-34 _____;
35-45 _____; 46 and over _____

		TIME INVOLVED PER WEEK	PROJECTED TIME IF MORE FACILITIES WERE AVAILABLE
Active Recreation			
	Bicycling	____hrs.	____hrs.
	Walking	____hrs.	____hrs.
	Canoeing	____hrs.	____hrs.
	Bowling	____hrs.	____hrs.
	Golfing	____hrs.	____hrs.
	Tennis	____hrs.	____hrs.
	Swimming	____hrs.	____hrs.
	Others:		
	__________	____hrs.	____hrs.
	__________	____hrs.	____hrs.
	__________	____hrs.	____hrs.
Spectator Recreation			
	Films	____hrs.	____hrs.
	Libraries	____hrs.	____hrs.
	Museums	____hrs.	____hrs.
	Concerts	____hrs.	____hrs.
	Theater	____hrs.	____hrs.
	Parties	____hrs.	____hrs.
	Picnics	____hrs.	____hrs.
	Hobbies	____hrs.	____hrs.
	Radio-phono	____hrs.	____hrs.
	TV	____hrs.	____hrs.
	Others:		
	__________	____hrs.	____hrs.
	__________	____hrs.	____hrs.
	__________	____hrs.	____hrs.

Based on the community survey, discuss the following questions.

- Are there age-related differences in recreational pursuits? Classify and describe the results by age groups: under 15; 15-24; 25-34; 35-46; 46 and over.

- Does the age of the participant influence the amount of time per involvement? How? Why?

- Does the sex of the participant influence the amount of time per involvement? How?

- What are the benefits of open spaces for the individual, society, and the environment?

RELATED ACTIVITIES:

- Invite a knowledgeable speaker to discuss parks and recreational facilities in the community.

- Invite a doctor and/or physical therapist to discuss recreation from a physical, social, and emotional viewpoint.

- Create a pamphlet giving information about: value of recreation; value of physical exercise; safety rules for various recreational pursuits; first aid related to possible accidents; and available park resources.

- Hold a panel discussion emphasizing place and importance of recreation in our society; community and health benefits of recreation; and how an individual may benefit from community recreational opportunities.

- Prepare and present a skit for primary students about recreational facility safety.

- What is stress? What are its chief causes? Relate stress to the need for recreation. Distinguish between physical and emotional stress.

- Conduct a discussion on aerobic activities as they relate to recreation and the environment. Is there any connection between "aerobic" used in this context and its use in science education?

RESOURCE MATERIALS:

Cooper, Kenneth A. Aerobics. New York: Bantam Books, 1968.

Hanson, Dale. Health Related Fitness. Belmont, California: Wadsworth Publishing Co., Inc., 1970.

Heinzelman, Fred and Richard Bagley. "Response to Physical Activity Programs and Their Effects on Health Behavior," Public Health Reports, 85:10, pp. 905-910.

Kaplan, Max. Leisure in America: A Social Inquiry. New York: John Wiley and Sons, Inc., 1960.

Palmore, Erdman and L. Clarke. "Health and Social Factors Related to Life Satisfaction," Journal of Health and Social Behavior, March 1972, pp. 68-79.

Raymore, Henry and H. Stuart Ortloff. It's Your Community. New York: Barrow & Co., 1965.

Environmental Health and Values

SYLLABUS REFERENCE: Health, Strand IV Environmental and Community Health, Ecology and Health Grades 7, 8, and 9; *V. The Individual's Health As Affected by Reacting With His Environment,* pp. 32-34.

ENVIRONMENTAL REFERENCES: Health: Stress
Economic/Social/Cultural Environments:
Lifestyle

OBJECTIVES:

- To study and recognize the importance of personal achievements, goals, and social contacts to one's development
- To define the construct of personality and those factors which influence one's personality
- To recognize the factors that influence values and priorities
- To examine personal lifestyles in relation to the environment
- To determine the major environmental problems in the community and identify the agencies responsible for these areas of environmental concern

PROCEDURES:

1 Define the term values and discuss how values affect perception, choice, and behavior.

- How are values acquired?
- What part do values play in fulfilling personal needs? Cite examples.
- What commitments are inherent in one's set of values?

Involve students in an exercise of priority ranking their own values. A sample list is provided below, along with questions designed to motivate some self-analysis.

-gun
-Bible
-TV guide
-bicycle
-car keys
-aspirin
-parks
-dollar bill
-encyclopedia
-glass of water

- Rank each item above according to its value to *you.*
- What is your rationale for your ranking of each item?

- Join with a group of four other students and reach a group decision on the value of each item in the list.

- As a member of the class, discuss any difficulty and your feelings about reaching a decision with your group.

2 Continue the discussion of the rank ordering with the class, focusing on the questions, "How readily could the community as a whole reach agreement on local environmental health priorities? What factors would affect the ranking of priorities at the community level?"

3 Have students write a brief paragraph on their views of the "good life."

4 Have the students rank order components of the "good life." A sample follows. Discuss the meaning of each element so that students understand what each would involve.

_____ Enjoyment through the senses
_____ Contemplative retreat
_____ Full participation in social groups
_____ Flowing with natural processes
_____ Dominating by physical activity
_____ Balancing: action, thought, and enjoyment
_____ Rational self-control
_____ Seeking out challenges

Discuss the environment which would be required for each lifestyle.

- How would the lifestyle affect the environment?

- Are there (national, state, local) environmental problems which are a direct result of dominant lifestyles?

- What specifically are the problems that occur in your area?

- How does your current lifestyle affect the environment?

- If you were to change your current lifestyle, how would the environment be affected?

- Would you change your present or proposed lifestyle if it would improve the environment? Why, or why not?

5 Determine the local environmental problems as viewed by (a) town supervisor; (b) conservation advisory council; (c) beautification commission; (d) county health department; (e) planning board; (f) mayor; (g) local civic group; and (h) citizen. Arrange to interview any or all of the above and ask the following questions:

- What environmental problems exist within the community? From your viewpoint, has anything been done to alleviate these problems? Explain.

- What are the State and local ordinances or laws concerning the problems?

- How do the problems affect (or potentially affect) members of the community?

- Rank the problems as to severity and need for commitment of funds or action.

- What role might individual citizens play in alleviating the problem?

6 Survey the attitudes of citizens regarding their community. A suggested form is shown on page 49.

- Analyze the results of the survey.

  -Is there general agreement among those surveyed concerning priorities?
  -Where do problems which have the greatest potential effect on health rank?
  -What would account for any differences in the ranking?

- Look at all of the proposed problems with a public health view and rank them according to:

  -importance in terms of survival
  -freedom from disease and disability
  -efficient, productive human performance
  -desirable quality of life

7 Collect, read, and analyze articles relating to local environmental problems.

- How effectively does the message convey the problem?

- Is a potential health problem suggested in the article? Explain.

- Could the article be misunderstood? If so, in what way?

- What factors determine and influence reception and perception of information? Explain the specific influence of each.

8 Contact a local journalist to determine the extent and type of coverage given to environmental and health problems.

RESOURCE MATERIALS:

Kaplan, Max. Leisure in America: A Social Inquiry. New York: John Wiley and Sons, Inc., 1960.

Raymore, Henry B. and H. Stuart Ortloff. It's Your Community. New York: Barrows and Co., 1965.

Sherman, Anthony C. Our Wounded Land. Connecticut: Pendulum Press, 1972.

Citizen Survey					
	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
1. The community is good enough without starting any new community improvement programs.					
2. This used to be a better community to live in.					
3. Long-term progress is more important than immediate benefits.					
4. We have too many organizations for doing good.					
5. There are too many youth programs.					
6. Too much time is spent planning community projects and not enough in carrying them out.					
7. There should be more recreational facilities.					
8. More industry would only create more problems.					
9. What is good for the community is good for me.					
10. There are environmental problems that we should be attacking. (Identify the problem you have in mind, if you agree.)					

Animals and Man's Health

SYLLABUS REFERENCE: Health, Strand IV Environmental and Community Health, Ecology and Health, Grades 7, 8, and 9; *III. Man's Health and the Biological Environment*, pp. 16-23.

ENVIRONMENTAL REFERENCE: Health: Interdependence

OBJECTIVES:

- To develop an understanding of the nature of ecological interdependence
- To demonstrate that modes of living and levels of health are influenced by the interaction of ecological variables

PROCEDURES:

1 Elicit from students a list of the different ways animals are used by people, or distribute a list containing some and discuss. Examples:

- aesthetic value
- to ensure a balanced ecosystem
- a source of fuel
- clothing
- scientific research
- police work
- guide dogs
- transportation
- protection
- recreation (racing, riding, hunting, circus, zoo, show)
- beasts of labor
- food
- symbols of spirtuality
- pets (emotional or social status symbol)
- source of fertilizer

2 Ask students to select five major uses of animals and to rank them in the order of their importance: (1) from their personal viewpoint; (2) for the United States, in general.

- In what ways were the students' priorities lists different?
- What social, cultural, emotional, or environmental factors might have contributed to these differences of opinion?
- What animals fill each of the major needs listed?
- What alternatives, if any, are there to animals for each of these uses? Why do people continue to use animals?

3 Organize students into small groups and conduct a brief discussion on the potential problems created by animals.

- Problems created by:

  -stress
  -loss of food crops
  -noise
  -odor
  -pollution of surface water
  -disposal of solid waste
  -flies
  -safety (bites)
  -contamination of foods (rats)
  -zoonoses* (may be listed separately)

Zoonoses* - diseases communicable from animals to man under natural conditions; e.g., rabies, encephalitis, trichinosis

4 Have students survey the community to determine the citizen's view of:

- how animals are beneficial to humans
- problems caused by animals within the community

5 Use periodicals to investigate types and incidences of zoonoses.

- How extensive is the zoonotic problem in the area?
- What do the following local groups think about the zoonotic problem?

  -dog warden
  -health department
  -local veterinarian
  -official from U.S. Wildlife Service

6 Identify and investigate other problems which are caused by the cohabitation and interaction of humans and animals. For information about these problems, contact a:

  -humane society
  -local farm organization
  -town official knowledgeable about local animal ordinances

- Make a list of these problems, briefly describing each.
- How extensive and serious are the problems?
- What measures are being taken to control them?

RELATED ACTIVITIES:

- Invite a health department representative to address the class concerning rodent control.

  -To what extent is the rat a problem locally?
  -What is being done to control the problem?
  -What caused the problem locally?
  -What societal values have contributed to the rat problem?

RESOURCE MATERIALS:

Purdon, Walter P. Environmental Health. New York: Academic Press, 1971.

Tracking Disease from Animal to Man. Washington, D.C.: U.S. Government Printing Office.

HEALTH (10-12)

Solid Waste Disposal

SYLLABUS REFERENCE: Health, Strand IV Environmental and Community Health, Environmental and Public Health, Grades 10, 11, and 12; *III. Physical Environment*, pp. 24-26.

ENVIRONMENTAL REFERENCE: Solid Waste: Disposal methods

OBJECTIVES:

- To determine the solid waste disposal methods presently used within the community
- To investigate the health and safety hazards of the present methods of solid waste disposal
- To plan an informational campaign to explain how individual citizens can deal with, or contribute to the solution of, the solid waste disposal problem

PROCEDURES:

1 Show the film, Tragedy of the Commons. Discuss the following questions.

  - How effective might this film be in alerting the community to environmental problems?
  - Where are the "commons" in your immediate area, city, or town?
  - Who is responsible for the "commons?"
  - How can people as individuals and as groups effectively fulfill that responsibility?

2 Discuss with students the areas of public health affected by the problem of solid waste (i.e., survival, epidemics, desirable quality of life, human productivity).

3 Discuss media and how effectively various modes of communication convey messages regarding environmental health. The following questions may be used.

- How are messages relating to health and environment best conveyed?
- Who can be reached by messages of public health concern? How?
- Why are people sometimes misinformed?
- What factors influence our reception and perception of information?

4 Conduct research to determine local ordinances governing dumping and burning of solid waste. Determine the number and nature of violation citations issued the previous year.

5 Map a given locale and outline open spaces, highways, parks, open dumping sites, junk cars, and general litter. Record the worst areas on film for a class presentation.

6 Determine the health and safety hazards produced by the situations recorded above.

- Cut out reports on junk and waste from local newspapers.
- Write or call the county health department and local officials for information about means of litter, junk, and waste control and for copies of specific regulations about each.
- Invite a speaker from the health department or sanitation department to discuss specific questions. (Note: Outline the questions beforehand.)

7 Locate and map the site of the local landfill. Distribute the map to the class. Be sure the map includes the following:

- Location of the landfill relative to streams and bodies of water
- Location of the landfill relative to highways, housing, and population

8 Request a landfill inspection checklist from the county health department. Interview the landfill operator about the checklist.

9 Interview a local sanitation collector.

10 Survey the publications dealing with public health for articles relating to the occupational hazards associated with solid waste disposal.

11 Lead a presentation and discussion dealing with:

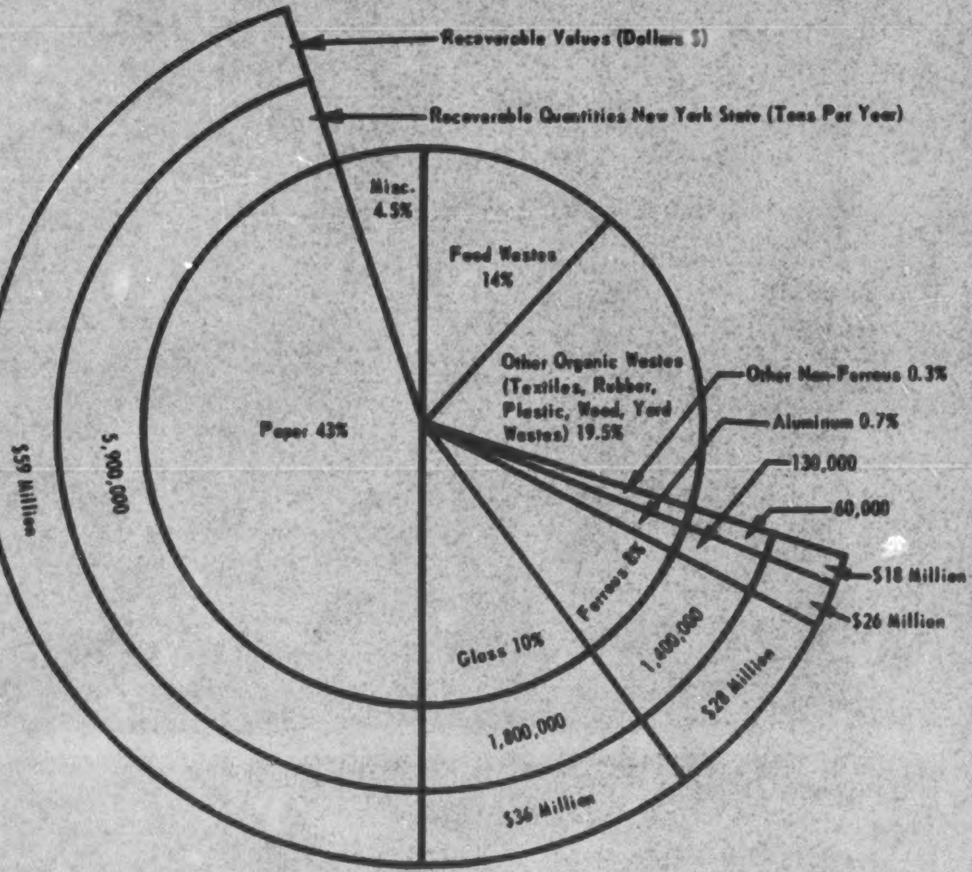
- Factual information gained about the local landfill
- Advantages and disadvantages of the landfill
- Physical, social, and emotional problems connected with an improperly managed landfill operation

12 Plan, outline, and execute a plan to inform the public about the solid waste landfill. Include all proper and improper functions of the landfill and the laws and regulations governing collection and disposal of solid waste.

RELATED ACTIVITIES:

- Determine the alternatives to landfills and burning.
- Investigate the problem of rodent control related to solid waste.
- Discuss or investigate the relationship between overall community sanitation and the levels of gastro-intestinal, skin, and respiratory infections within the community.
- Have students read the special report "Solid Waste as a Resource" in the October 1, 1974 issue of New York State Environment. With that as a background, discuss the following chart from that issue. Use questions the nature of the samples below.

AVERAGE COMPOSITION OF MUNICIPAL SOLID WASTE IN NEW YORK STATE AND RECOVERABLE MATERIALS



-Which type of solid waste would appear to be most profitable to recover? Which would be the most practical? Explain.
-Which solid wastes would be the least profitable to recover?
-What is the total dollar value of New York States' recoverable materials?
-Do the size and nature of your community warrant an investment in a recovering process? What besides money should be considered in this decision?

RESOURCE MATERIALS:

New York State Department of Environmental Conservation. "Solid Waste as a Resource," New York State Environment, October 1, 1974. Albany, N.Y.

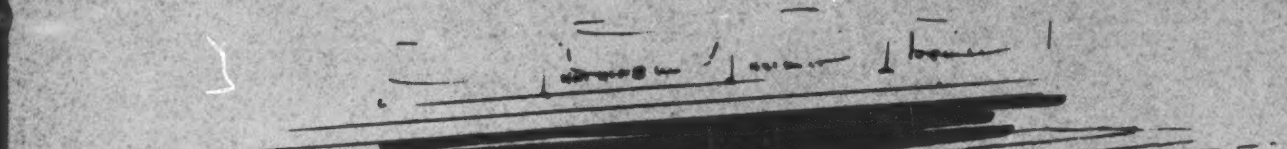
Purdom, Walter P. Environmental Health. New York: Academic Press, 1971.

Rogers, Edward S. Human Ecology and Health. New York: Macmillan, 1960.

New York State Department of Environmental Conservation. Sanitary Landfill. Albany, N.Y. 1975.

Tragedy of the Commons. 18 min., c. BEA Educational Media, 2211 Michigan Avenue, Santa Monica, Ca. 90404.

Wagner, Richard H. Environment and Man. New York: Norton and Co., 1974.



environmental education curriculum infusion units

industrial arts

for grades 7-12

INDUSTRIAL ARTS (7-8)

Recycling Scrap Metal

SYLLABUS REFERENCE: Early Secondary Industrial Arts; *Metals*, pp. 73-90.

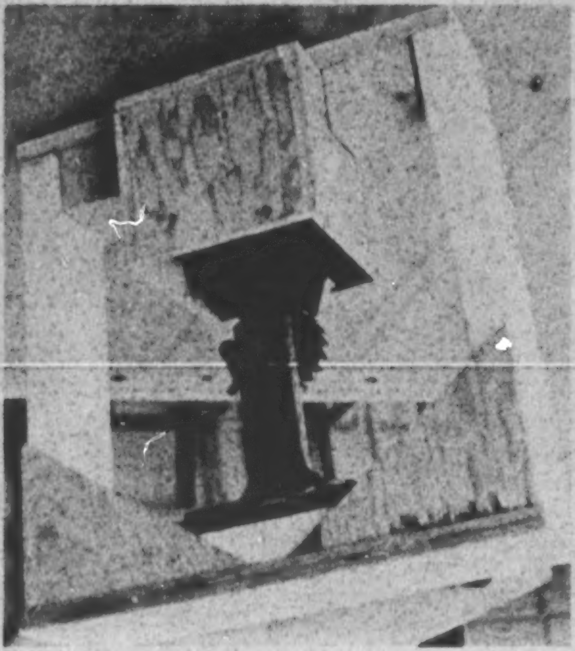
ENVIRONMENTAL REFERENCE: Resources; Recycling; Nonrenewable

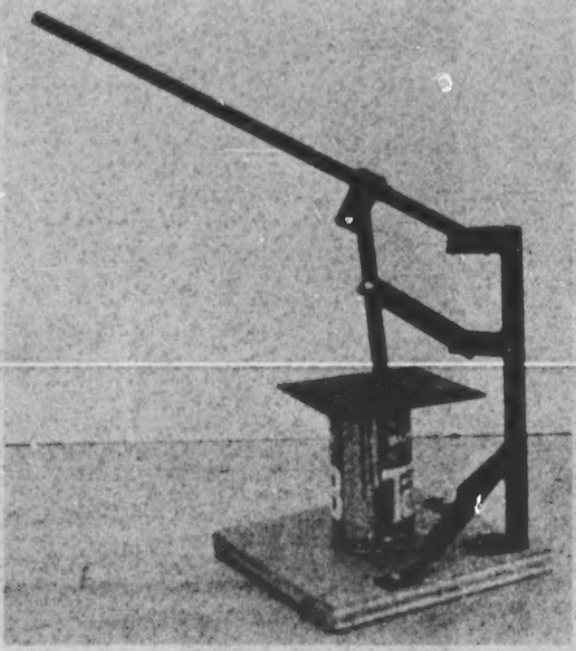
OBJECTIVES:

- To identify critical problems in steel recycling
- To explain the difference between mill scrap and consumer metal scrap
- To incorporate the essential elements of good design in the planning of an environmentally useful product
- To gain an aesthetic appreciation of scrap metal and its potential use as a medium for creative expression

PROCEDURES:

1 Discuss the problem of steel recycling. Assign a project to students in which they must design and construct a household can crusher. Many designs are possible; encourage variations in design, as in the examples below.





2 As the can crusher projects near completion, devote a period or two to discussing the relative advantages, disadvantages, and feasibility of various model designs.

- What are the characteristics of a practical can crusher?
- Do the designs of those created produce the necessary force to efficiently crush cans? Explain.
- Does the can crusher design limit the size and shape of cans which it can accommodate? Explain.
- Is the can crusher easy to operate for all members of the typical household? Explain.
- Does the particular design of the can crusher lend itself to mass production? Give reasons for your answer.
- If mass produced, would the can crusher be economically attractive?

3 The value of items classified as "scrap" or "trash" is a relative judgment. Many of the metal products discarded as waste can be used as a medium of expression. What might be useless in the eyes of one person, may not be in the eyes of another.

Direct students to collect discarded cans, wire, and industrial cutoff scraps. Using traditional sheet metal forming and fastening techniques, have them create realistic or abstract objects and shapes.

RELATED ACTIVITIES:

Traditional instruction in steel production normally includes identification and description of the various types of iron and steelmaking furnaces used by industry. The blast furnace is dealt with as the chief instrument in the ironmaking process, and the relative importance of the open hearth, basic oxygen, and electric arc furnaces is discussed.

In developing an increasing awareness about environmental problems, it would be useful at this time to discuss the capabilities of the three types of steelmaking furnaces in handling charges of scrap steel. (See Cannon, James S., Environmental Steel, p. 123.) The open hearth furnace can use a charge of about 50% scrap and 50% pig iron. The basic oxygen furnace, however, can handle a charge consisting of only 30% scrap. The electric arc furnace is outstanding in terms of recycling capability, being able to melt close to 100% scrap steel.

- In order to completely understand the construction of the steelmaking furnaces and to gain hands-on experience in basic metalworking, assign students the project of constructing a metal model of a particular style of steelmaking furnace. Meaningful scale models can easily be made using common sheet metal forming machines. All models will require instruction in cone pattern development.

- Discuss the disadvantages of the electric arc furnace in terms of productivity and energy consumption.

- Ask each student to prepare a short written report explaining the basic theory of operation and recycling capabilities of the furnace model he constructed. Included should be a list of advantages and disadvantages of that type.

- Discuss the critical problems which the steel recycling effort has faced in recent years.

- What can be learned about railroad freight rates which has a direct bearing upon the amount of scrap which is recycled?

RESOURCE MATERIALS:

Cannon, James S. Environmental Steel: Pollution in the Iron and Steel Industry. New York: The Council on Economic Priorities, 1974.

Gerbracht, Carl, and Frank E. Robinson. Understanding America's Industries. Bloomington, Illinois: McKnight and McKnight Publishing Co., 1962, pp. 44-49.

Phoenix Quarterly. The Institute of Scrap Iron and Steel, Inc., 1729 H. Street, N.W., Washington, D.C. 20006.

Szekely, Julian, Ed. The Steel Industry and the Environment. New York: Marcel Dekker, 1973.

INDUSTRIAL ARTS (9-12)

The Ceramics Industry: Natural Resources, Recycling, and Pollution

SYLLABUS REFERENCE: Secondary Industrial Arts: An Instructional Planning Guide; *Ceramics*, p. 2.

ENVIRONMENTAL REFERENCE: Resources: Recycling

OBJECTIVES:

- To identify the seven major industries classified under the broad heading of "ceramics"

- To identify the major raw materials used by these industries to produce their products

- To estimate the status of the natural resources for these materials in the United States

- To explain production processes which cause pollution in any two of the seven industries

- To identify recycling procedure(s) for the products developed by any two of the seven industries

PROCEDURES:

1 Discuss the ceramics industry by way of helping students recognize the related divisions. Assign a group of three or four students to research each division: abrasives, cement, enamels, glass, refractories, stone, and whitewares, responding to each of the following:

  - What raw materials do these industries use to manufacture products?

  - If possible, obtain an estimate of the quantity of each major raw material consumed annually.

  - If possible, obtain an estimate of the availability of the natural resources for these materials in the United States. (What percentage, if not all, of the resource is obtained in the United States?)

  - What major processes are used by this industry to manufacture its products? Suggest that the students develop flowcharts.

  - Which major processes cause serious pollution problems? Discuss these problems.

  - What has the industry done to prevent pollution?

  - Can the major products of these industries be recycled? Are they being recycled? Give examples.

  When the students have completed their research, direct them to share it with the rest of the class through oral or written presentations.

2 Invite a public relations representative from one of the ceramic industries selected by the students to give a presentation to the class. Use the questions and students' answers from above, and any other pertinent questions or information, to facilitate a discussion after the presentation.

3 Using the following questions, conduct a class discussion on waste, recycling, and industrial pollution.

  - To what degree should an industry be responsible for initiating a recycling program for unused and discarded materials?

  - Who should be responsible for controlling industrial pollution? Why?

  - What can you do to prevent the abuse of our natural resources by some of the ceramic industries?

RELATED ACTIVITIES:

- Involve the students in a field trip to a local ceramic-related industry selected by them. Observe the production processes, the raw materials used, possible problems, and any recycling procedures.

RESOURCE MATERIALS:

Budworth, D.W. An Introduction to Ceramic Science. Elmsford, New York: Pergamon Press, Inc., 1970.

Colson, F. "Workshop: Kiln Building with Space Age Materials," Craft Horizon, August 1970, pp. 46-48.

"In Praise of Pottery and Young Craftsmen In-The-Making," Parents' Magazine and Better Homemaking. February 1974, pp. 54-55.

Mueller, P.P. "Doing It The Hard Way," School Arts, January 1975, pp. 40-42.

INDUSTRIAL ARTS (9-10)

Waste Management: An Industrial Concern

SYLLABUS REFERENCE: Secondary Industrial Arts... an Industrial Planning Guide.

ENVIRONMENTAL REFERENCES: Resources: Renewable
Solid Waste: Recycling

OBJECTIVES:

- To create an awareness of the ways in which productive resources are being wasted in the student's community
- To create an awareness of how any form of waste affects the lives of the students and their families
- To develop an appreciation of the need for efficient economic and business organization with respect to the environment
- To define problems in a manner that would be conducive to rational analysis and decisionmaking
- To give the students the opportunity to teach each other and in doing so to become aware of the importance of good communication

PROCEDURES:

1 One of the fundamental concerns of all the nations of the world is to satisfy the wants and needs of their people. The major problem evolving from this concern is the limited amount of productive resources with which to satisfy unlimited wants and needs. One partial solution to the problem is for all nations of the world to economize; that is, to make the most efficient use of their productive resources. Inherent in the concept of efficiency is the concept of minimization of waste. Therefore, it is necessary for us to become aware of the various types of waste that exist in our community and to develop our own ideas and strategies to reduce or eliminate them.

Direct students to take slides of the various forms of waste they observe in their community. After the film has been processed (approximately 3 weeks), provide time for students to show their slides to the class and to explain the type of waste exhibited.

2 Ask students to analyze the problem of industrial waste and to suggest reasonable solutions.

- How would costs be affected by these solutions?
- How would profits be affected?
- What other effects might these solutions have?
- How does this hypothetical action demonstrate the many related problems that may arise when one change is made in a vast and intricate economic system?
- What is the government's responsibility in relation to the waste of resources by industry?
- Cite specific legislation which has been proposed or enacted to minimize the inefficient use of resources.

RELATED ACTIVITIES:

- What resources does this country waste or use inefficiently?
- Explain why these practices are wasteful and attempt to explain the attitudes which permit them to occur.
- Does the waste of these resources result in the waste of any other resources (time, energy, etc.)?
- What problems might society be confronted with if these wasteful practices continue?

- How does this waste affect business costs? Profits? Salaries? Jobs? Give specific examples.

- Does this waste affect you and your family in any way? If so, how?

- Does this waste affect the purchasing power of your money?

RESOURCE MATERIALS:

Hacker, Leroy. Waste Is Wealth. Philadelphia, Pa.: Dorrance, 1970.

Packard, Vance. The Waste-Makers. New York: David McKay Co., Inc., 1960.

INDUSTRIAL ARTS (9-12)

The Efficient Use and Recycling of Materials in the Industrial Arts Laboratory

SYLLABUS REFERENCE: Secondary Industrial Arts, an Instructional Planning Guide; Industrial Arts Education, Organization and Administration.

ENVIRONMENTAL REFERENCE: Resources: Recycling

OBJECTIVES:

- To idenfity the many types of materials used in the classrooms and laboratories of an industrial arts department

- To recognize the attempts and/or lack of attempts by students and teachers to make efficient use of available materials and energy

- To identify the processes and/or lack of processes employed by students and teachers to recycle waste or unused materials

- To recognize the steps that may be taken in industrial arts classrooms to solve pollution problems

PROCEDURES:

1 Discuss with students, and compile a list of, the various materials and the types of energy used in the industrial arts classrooms and laboratories.

2 Involve students in designing a survey to determine to what degree students and teachers use materials and energy (human included) as efficiently as possible. The survey should also include questions regarding the recycling of waste or unused materials and pollution controls, if any. A sample is provided on page 64.

Sample Survey

Part A

Questions to be Answered by the Teacher

1. In any given week, what types of materials would your students use (e.g., wood, metal, etc.)?

2. Does your shop create what might be considered an environmental problem (e.g. dust, noise, engine exhaust)? If so, has anything been done or could anything be done to cope with the problem?

3. What happens to the unused or waste materials left over after a project is completed?

4. Do you feel that the students are concerned about using materials as efficiently as possible? Why, or why not?

5. Would it be possible to recycle the waste materials into some type of useful item?

6. In any given week, approximately how much material (lumber, metal, paper, etc.) is used in your classroom?

Part B

Questions to be Answered by the Survey Team

1. Did you notice any apparent waste of electrical energy (e.g., machine running while not being used)? If so, explain. ______________________________
   ____

2. Did you notice any wasteful practices in regard to unwise use of materials? If so, explain.
   ____
   ____

3. Do students seem to be using their time efficiently in their work? Explain. ______________________
   ____

4. As a result of student activity, did you observe any situations that could be considered a pollution problem? If so, explain. ______________________
   ____

3 Organize students into groups and prepare them for a visit to the classrooms of the school's industrial arts department. Obtain permission from the other industrial arts teachers and the supervisor for the class observations and survey.

4 Assign one survey team to each classroom. As shown in the sample survey, Part A, one student asks the teacher a number of questions on efficiency and recycling. Other team members concentrate on the students' use of materials and energy, observable pollution situations, and the students' general work efficiency, and record observations on Part B.

5 Direct each survey team to report its findings to the entire class. Then organize the class to prepare a composite report of the data collected. Analyze and discuss this final report.

RELATED ACTIVITIES:

- Has this exercise made you aware of the need for more efficiency in the use of materials and energy? More concerned?
- Identify at least two methods of pollution control used by the industrial arts classes. Why are these controls used?
- Identify several types of materials used in each of the industrial arts classes. How or where are these materials obtained?
- Describe in detail the consequences of continued misuse of energy and unwise use of natural resources.
- Reflect on the consequences of an industrial society that has little regard for, or makes no attempt to control, pollution.
- Reflect on the effects in society of this failure to recycle unused and discarded materials.

RESOURCE MATERIALS:

Environmental Crises: What the Individual Can Do. Filmstrip, record, guide, script. National Education Association, 1201 16th Street, N.W., Washington, D.C. 20036.

Pringle, Laurence. Recycling Resources. New York: Macmillan, 1974.

The Shadow of Progress. 26 min. color. Modern Talking Picture Service, 315 Springfield Avenue, Summit, New Jersey, 07901.

INDUSTRIAL ARTS (9-12)

An Exercise in Recycling and Land Use

SYLLABUS REFERENCE: Secondary Industrial Arts... An Instructional Planning Guide; *Graphics Technology*, p. 10; *Production Technology*, p. 12.

ENVIRONMENTAL REFERENCES: Resources: Recycling
Land Use: Reclamation; Open space

OBJECTIVES:

- To list and explain the procedural steps needed to convert vacant land and discarded materials into a children's park
- To appreciate a project experience involving students, teachers, and the community
- To realize the benefits a recycling program can have on a community

PROCEDURES:

1 Prior to student involvement in the project, acquire an appropriate section of land, preferably through donation by a private citizen, by businessmen, or by the governing body of the village, town, city, or county. Enlist the support of the Department of Parks and Recreation, if there is one, or a strong group of concerned citizens in this undertaking. When a suitable land site is available, seek the approval of the school district's administrators. Involve the district's legal counsel to obtain a construction permit and to investigate special ordinances and zoning regulations. The cooperation and support of the industrial arts staff and coordinator are also essential to the ultimate success of the project.

2 Involve the students of the drafting (mechanical drawing) program in an accurate survey of the land site. If a transit is not available in the school, one may be borrowed from a local construction company. The survey should determine the exact dimensions, contours, and the locations of trees and shrubs on the site. The completed park should blend into the natural surroundings.

3 Organize several teams of students with teacher leaders to research the designs, terrain, and structural materials of existing children's parks in the area. Consider carefully the durability and safety of the recyclable construction material, such as automobile tires and railroad ties, with regard to the age group of the children for whom the park is intended.

4 Concurrent with the planning and design phase, several graphic arts students should circulate letters among local businesses explaining the project and requesting the donation of recyclable materials and, most importantly, their valuable advice. Also, solicit local construction

firms for a donation of the concrete for footings to support the park apparatus and sand for the park play surface. Their technical advice on the construction of the footings should also be obtained.

5 Once the construction materials have been secured or guaranteed, again organize the drafting students (mechanical drawing and architectural design students) into groups to design the entire park on the selected land site. Careful consideration must be given to the types and amounts of materials donated, the amount of concrete donated, and the topography of the land site. Further, encourage the students to be original in their planning. The recreation equipment should not be designed along traditional lines. Their drawings should then be submitted to a committee of representative students and teachers for selection of the best design. Involve all of the drafting and art department students in the refinement and improvement of the best selected design. Suggest that they construct a scale model.

6 Ask the drafting students to reproduce the completed "blueprints" for the students and teachers of the wood and metals programs. In each of these areas, organize the students to accomplish the following tasks.

- Cut and shape the structural members of the proposed park equipment.
- Construct the forms for the concrete footings.
- Make metal brackets, frames, sheets, and other essential parts; procure all the hardware (bolts, nuts, lag screws, etc.).

7 Organize volunteer student teams from all the industrial arts programs for the pouring of the concrete footings and any other concrete formations planned, for the grading of the sand base, and for any rough landscaping indicated in the project design. The concrete pouring stage requires careful coordination with those students constructing the equipment supports (railroad ties, for example) and concrete forms.

8 Invite ceramics and art students to the park site to draw "children's" graffiti in the poured, wet concrete. By this time, any preparatory landscaping should be completed, the concrete poured into the forms, the equipment supports and other components (rubber tires, for example) set in the concrete, and the sand spread and graded over the park surface.

9 Direct the woods and metals students to construct the various pieces of recreation equipment (as designed).

10 Conduct a final check on the completed park facility with a committee composed of students and teachers representing the various work groups. Involve school, local government, and park officials to assure them that the park equipment and site are safe and ready for use.

11 Conduct a follow-up study the purpose of which is to determine the overall effectiveness of the children's park project. Encourage student volunteers to carry out surveys and to make observations the following summer in order to answer these questions.

- How many children use the park daily?
- Which age group is most attracted to the park? For what reasons?
- How well has the equipment sustained heavy use?
- Which pieces of equipment interest children the most? Why?
- What problems have resulted from faulty landscaping or the general design of the facility?

A project of this nature was undertaken and completed in the spring of 1972 by the Industrial Arts and Art Departments of Liverpool High School and the Onondaga County Parks and Recreation Department. "Children's Landing" is located on the eastern shore of Onondaga Lake in the village of Liverpool, New York. The detailed description in this unit may serve as a model for others. Obviously, any summer project need not be as extensive as this and may be adapted to meet the needs of any community. (A series of eight photographic negatives depicting the construction of "Children's Landing" may be obtained for $1.60 by writing to: Science Supervisor, Liverpool Central Schools, Liverpool, New York 13088.)

RELATED ACTIVITIES:

- Why is it necessary for today's society to begin recycling programs? Explain in detail.
- Who is responsible for the initiation of recycling programs?
- What are the current positions of our local, state, and Federal governments on recycling programs?
- Identify several conditions or practices which have created the need for recycling programs.
- What are the possible long-range effects that recycling programs could have on our environment?
- Conduct a poster campaign to convince the student body it should help in the recycling of discarded materials.
- Create a series of cartoons for the school paper suggesting ways to recycle unused materials or litter at school or in the community.

RESOURCE MATERIALS:

Ressner, Philip. Park in the City. New York: Dutton.

Witaker, Ben, and Kenneth Browne. Parks for People. New York: Schocken Books, Inc., 1973.

INDUSTRIAL ARTS (9-12)

Better Utilization of Forests and Wood Products

SYLLABUS REFERENCE: Secondary Industrial Arts... An Instructional Planning Guide; *Woods - Wood Products: Forestry*, p. 9.

ENVIRONMENTAL REFERENCE: Resources: Renewable; Recycling

OBJECTIVES:

- To develop an understanding of the various ways wood is usually wasted
- To explore techniques for minimizing forest depletion by using, or reusing, wood materials normally wasted
- To investigate the multiple benefits to our environment derived from paper recycling

1 Discuss with students, and compile a list of, the various ways materials from trees are wasted. Such a list might include sawmill waste, forest waste, woodchips and shavings, secondary tree products, and paper waste.

2 Involve students in setting up committees to investigate ways for utilizing wood byproducts.

(1) Committee: Use of Forest Waste by Chemical Stabilization

Study the displacement process within the cell structure of wood by which PEG (polyethylene glycol) dimensionally stabilizes green wood. Relate how these stabilizing qualities of PEG can be applied to the enormous bulk of green wood scraps currently left on forest floors during primary logging operations.

- Why is so much small, odd-shaped wood considered waste in the logging process?
- What are the indirect environmental advantages of the use of PEG?
- Have students secure green wood from local lumber mills. Set up an experiment involving turning bowls from green lumber. Use untreated green lumber for half of the bowls and identical wood soaked in PEG for the remainder. Document the progress of the experiment with photographs. Note the development of warpage and checks in the untreated wood.
- Conduct a discussion on whether or not wood left on a forest floor is waste. Could it be economic waste but not ecological waste? Ask students to take into consideration natural recycling.

(2) Committee: Utilization of Slabwood and Other Sawmill Wastes

- What is slabwood? Investigate its possible constructive uses.
- What are the characteristics of slabwood that make it suitable for hand and machine woodworking?
- What types of products lend themselves to the utilization of slabwood?

Design and construct at least one project per student using slabwood.

- What types of problems are encountered in working with slabwood?
- How do products made from slabwood compare with similar products made from more conventional lumber?
- Examine the projects and their designs. Do they capitalize upon the unique characteristics of slabwood?
- Is the overall appearance of the projects aesthetically harmonious with the environments in which they will be placed?

Assign students the following reading assignments (see Resource Materials).

- "Uses for Slabs, Edgings, and Trims"
- General Recommendations Regarding Methods for Wood Waste Utilization
- Wood Products Manufactured at Small Sawmills and Woodworking Plants

(3) Committee: Recycling Paper Products

Visit a local paper mill or paper packaging industry. If possible, select one that recycles paper within the plant.

Recycle paper as outlined on page 13 of Teaching Resource Recovery in Industrial Arts, published by the National Center for Resource Recovery and the National Association of Secondary School Principals.

- How is paper broken down into recyclable fibers by industry?
- What are the multiple benefits to our environment provided by paper recycling?

Examine recycled paper produced in the laboratory. Note the nature of the interlocking fibers.

- How could a more finished product be produced?

(4) Committee: Utilization of Wood Chips and Shavings

Collect thick shavings from a jointer or planer. Prepare a piece of rigid particle board by placing the shavings on a piece of hardboard;

saturating with white glue; covering with a second hardboard platen (tempered surface down); and clamping the two together with a pair of large hand screw clamps. Given a period of time to cure, a rigid piece of particle board will be produced.

- How is particle board made industrially?
- What other methods might be devised to make particle board? Encourage further experimentation by the students.

Design and build experimental presses for making a higher quality particle board.

- What tests can be used to evaluate the particle board for strength, durability, warpage, elasticity, and impact resistance?
- How can the necessary testing apparatus be constructed to evaluate the experimental presses?
- Set up a chart of the test data on each type of material tested.

Read appropriate sections of the Resource Materials selections on board materials listed at the end of this unit.

(5) Committee: "Onion Ring" Bowls

Construct a bowl from a flat disc of wood by using the "onion ring" method rather than the traditional bowl-turning procedure. Refer to the article "Onion Rings" in the November 1974 issue of School Shop.

- Compute the number of board feet of wood conserved by using this method.

RELATED ACTIVITIES:

- Cooperate with the science department in setting up an experiment on the destructive distillation of wood.
    - What secondary wood products are obtained?
    - How are these products used?
    - How is wood used as a source of fuel? What are the environmental advantages and/or disadvantages of wood as a source of fuel?
- Arrange for a school display of the projects produced by the various committees.

RESOURCE MATERIALS:

Auchtor, Richard T. "Recycling Forest Products Retrieved From Urban Waste," Forest Products Journal, Rebruary 1973, pp. 12-16.

Foulger, A.N., and John Harris. General Recommendations Regarding Methods for Wood Waste Utilization. Madison, Wisconsin: Forest Products Laboratory, 1971.

Harkin, John M. *Uses for Sawdust, Shavings, and Waste Chips*. Madison, Wisconsin: Forest Products Laboratory, 1969.

Heebink, B.G. "Particle Board from Wood Residue," *Forest Products Laboratory*, March 1972.

Landt, Eugene F., et al. "Onion Rings," *School Shop*, November 1974, p. 37.

Lewis, Wayne C. "Board Materials from Wood Residues," *Forest Products Laboratory*, July 1971.

Linsk, Stephen A. *Separating Paper at the Waste Source for Recycling*. U.S. Environmental Protection Agency, 1974.

Malcolm, Frederick B. *Wood Products Manufacture for Small Sawmills and Woodworking Plants*. Madison, Wisconsin: Forest Product Laboratory, 1973.

Myers, Gary C. "Particle Board," *Forest Products Laboratory*, January 1973.

Reineke, L.H. *Wood Fuel Combustion Practice*. Madison, Wisconsin: Forest Products Laboratory, 1960.

Reineke, L.H. "Uses for Slabs, Edgings, and Trims," *Forest Products* Laboratory, March 1964.

environmental education curriculum infusion units

mathematics

for grades 7-12

MATHEMATICS (7-9)

Applying Mathematical Problem-Solving to Environmental Issues

SYLLABUS REFERENCES: Mathematics: Courses for the Seventh Year and Eighth Year; *Topic V, Ratio, Proportion, and Percent,* pp. 14-16; *Topic VI, Statistics,* pp. 28-29. Ninth Year Mathematics, Course 1; *Topic III, D., 9.,* p. 5; Ninth Year Mathematics Course 1 - Algebra; *Topic III, Algebra, D., 8.,* p. 5.

OBJECTIVES:

- To understand that there is a need to develop technical and sociological knowledge to control population growth, modify environments, and alter resource use patterns

- To recognize that most resources are vulnerable to depletion in quantity and quality

- To understand that any one of an environment's components, such as space, water, air, food, or energy, may become a limiting factor

- To recognize that the material welfare and aspirations of a culture largely determine the use and management of natural resources

Grade 7

ENVIRONMENTAL REFERENCE: Population: Growth rate

PROCEDURE:

1 Have a student collect the United States census figures for each of the last 10 decades, ending with 1970. Divide the class into 10 groups and assign each group a decade. Have each group compute the percentage increase in the population of the United States in its decade.

- Develop a graph to show the data collected.

- What trends can be seen in the percentages that the students computed? Graph the rate of change.

- What guesses can be made as to what the population of the United States will be in the next decade? In the next 20 years?

- What factors have accounted for the change in the rate of population growth for the United States during the past two decades?

- Is the most recent percentage rate of population growth for this country a suitable one in terms of the effect population has upon the environment and resources? Explain.

- Compare this rate for the United States with that of a Western European nation, an African nation, and a Southeast Asian nation. Then, answer the preceding question in the context of the rates for these nations.

Grade 8

ENVIRONMENTAL REFERENCE: Renewable: Water

PROCEDURES:

1 Have a group of students contact their city, town, or village government to obtain the gross figures for the amount of water used during each of the last several years. Direct them to construct a frequency polygon or histogram using the results. Further instruct them to:

- Figure the mean, median, and mode from the data collected.

- Determine the average annual use of water per person, using the current estimated population of the community.

- Compute the daily per person water usage to the extent that it is useful in considering water conservation practices.

2 As a variation of this activity, have another group of students whose home water supply is metered bring their water bills for the preceding several years. Have them compute the average daily, per person use of water for the selected households. Construct a frequency polygon or histogram using the results. Instruct the class to figure the mean, median, and mode of the individual household data, and to:

- Speculate as to what percentage of the water used might be wasted.

- Consider what factors cause this water to be wasted and how they might be avoided

- Describe several actions which might conserve water in the household and project what percentage savings of water these measures represent.

- Relate the use of water to energy consumption and suggest what types of conservation of domestic water are most important.

Grade 9

ENVIRONMENTAL REFERENCE: Energy: Fuel supplies
Pollution: Air, Engine emission

PROCEDURES:

1 Provide the class with the following problem for solution. A trucking company specializes in hauling goods from Albany to Buffalo, a distance of 280 miles. If the truck drivers are paid $5.00 per hour, what percent increase in cost resulted from the change in the State speed limit from 65 miles per hour to 55 miles per hour (presuming, of course, that drivers adhered to the limits in both instances)? Discuss:

- Why the speed limit was lowered.
- Who eventually absorbs the company's increased operating expenses and why.
- How these increased costs are partially offset by greater fuel economies.
- What implication this might have for the railroads.

2 Suggest the following problem to the class. Based upon emission control standards for cars manufactured since 1970, the carbon monoxide in exhaust fumes should not exceed 4 percent. A recent test of a 1972 auto indicated that 150,000 cubic centimeters of an exhaust sample contained 7,000 cubic centimeters of carbon monoxide. Using the principle of proportions, determine by how many cubic centimeters the carbon monoxide count must be reduced to meet the 4 percent requirement. Discuss the following.

- Have the standards for emission controls established by the Federal and state governments been realistic, manageable ones? Explain.
- What have been the objections of auto manufacturers to these standards?
- What effect have the emission control devices had on gasoline consumption? Explain.

MATHEMATICS (11)

A Formula For Growth

SYLLABUS REFERENCE: Eleventh Year Mathematics; *Topic II, Functions and Relations*, #14-16, pp. 9-10.

ENVIRONMENTAL REFERENCE: Population: Growth rate

OBJECTIVE:

- To recognize the implications of exponential growth for world population and its attendant considerations

PROCEDURE:

1 Have students work with a population growth formula in solving the following logarithm problem. Discuss the questions related to the problem.

$$p = p_o \times \left(1 + \frac{a}{100}\right)^{ct}$$

p = new population
p_o= original population
a = rate of population growth (constant)
c = factor of proportionality
t = time elapsed

If the population of the United States in 1970 was 210,000,000, (p_o), and the annual rate of population growth, (a), is .62 percent, what will the expected population be in 1990? (t = 20 years.) (The factor of proportionality, [c], is $\frac{1}{10}$.)

- How long will it take for the population of the United States to double?
- Graph the population growth of the United States from 1970 to 1990 using 5-year intervals.
- Suggest events that might take place which would alter the appearance of the graph developed in answer to the preceding question.
- Describe the appearance of a graph which would reflect each of these events.
- Estimate the current (1975) population of the United States.
- What is the environmental impact of a doubling of the population? List specific problems that arise as population increases.
- In terms of this environmental impact, how would you describe this rate of population growth (.62 percent)? Why?
- Obtain rates for other nations (in Europe, Africa, Asia, and Latin America) and compare them with the United States' rate. How soon will some of these nations experience a doubling of their populations? What effect will this have on their environments?

RESOURCE MATERIALS:

Citizens' Advisory Committee on Environmental Quality. *Citizens Action Guide to Energy Conservation*. Washington: Government Printing Office, 1973.

Freeman, S. David. "The Energy Joyride Is Over," *Science and Public Affairs*, October 1973, pp. 39-40.

environmental education curriculum infusion units

science

for grades 7-12

Sponge Simulation Activity: Interdependence

INTERDEPENDENCE 'WITHIN' AN INVERTEBRATE!

SYLLABUS REFERENCE: Science 7, 8, 9, Block C - Living Things Around Us; *III. Ecology, A. Interdependence of Living Things*, pp. 40-46.

ENVIRONMENTAL REFERENCE: Natural Environments: Communities/ecosystems

OBJECTIVES:

- To define "interdependence" in terms of its manifestation within a single, simple invertebrate, the sponge
- To explain the interdependence between the sponge and its environment
- To compare interdependence within the sponge to interdependence between the sponge and its environment

PROCEDURES:

1 Students are asked to demonstrate the interdependence within a simple organism by role-playing the parts of a sponge. Introduce the activity with the following descriptions of structural functions.

COLLAR CELLS:	Line inner body wall; have flagella; create currents which draw water into the sponge's body; catch food as it is swept into the body cavity; digest food
SPICULES:	needle-like, solid structures that make up the framework of the sponge
EXCURRENT PORE:	large opening which allows water to leave the body cavity
INCURRENT PORES:	openings which carry food and water into the central cavity
EGG CELLS:	cells which will develop into a new sponge when a sperm cell is carried to them by amebocytes through incurrent pores, to collar cells, to egg cell
PORE CELLS:	those cells which surround and form the incurrent pores
COVERING CELLS:	protective cells similar to the skin of higher animals
AMEBOCYTES:	cells which help in circulation of digested food and excretion of waste

2 To begin the simulation, volunteers for the various structures must take up their positions to form a section of the sponge as follows:

- 4 COVERING CELLS (C) should stand side by side in a line with arms connecting individual cells with one another but leaving space in between the middle cells for the pore cells.

```
-C-C-   -C-C-
```

- 2 PORE CELLS (P) should stand at right angles to the covering cells, facing each other with arms outstretched to form the pore itself.

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-C-C-P   P-C-C
```

- 2 SPICULES (Y) should stand quite rigidly in front of the first and last covering cells with arms and legs stiffly extended to provide support for the sponge.

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-C-C-P   P-C-C-
 Y             Y
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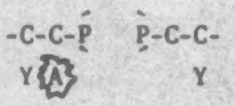
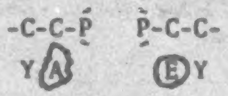
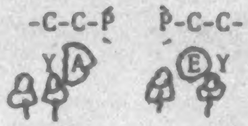
- 1 AMEBOCYTE (A) should stand in front of the second covering cell and, when called on to perform, it moves by extending its false feet and sliding slowly to its destination.



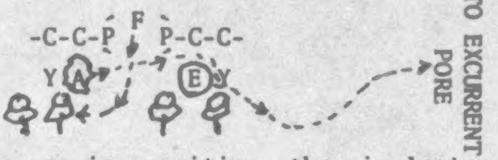
- 1 EGG CELL (E) should stand in front of the third covering cell and remain passive until fertilization.



- 4 COLLAR CELLS ( ) should stand in front of the spicules, amebocyte, and egg cell, with one arm extended in imitation of a flagellum. The collar cells must wave their flagella in order to draw water into the sponge.



- 1 FOOD PARTICLE (F) should stand outside the incurrent pore waiting to be drawn inside the sponge by the action of the collar cells.



3 When all the participants are in position, the simulation of food-getting can begin.

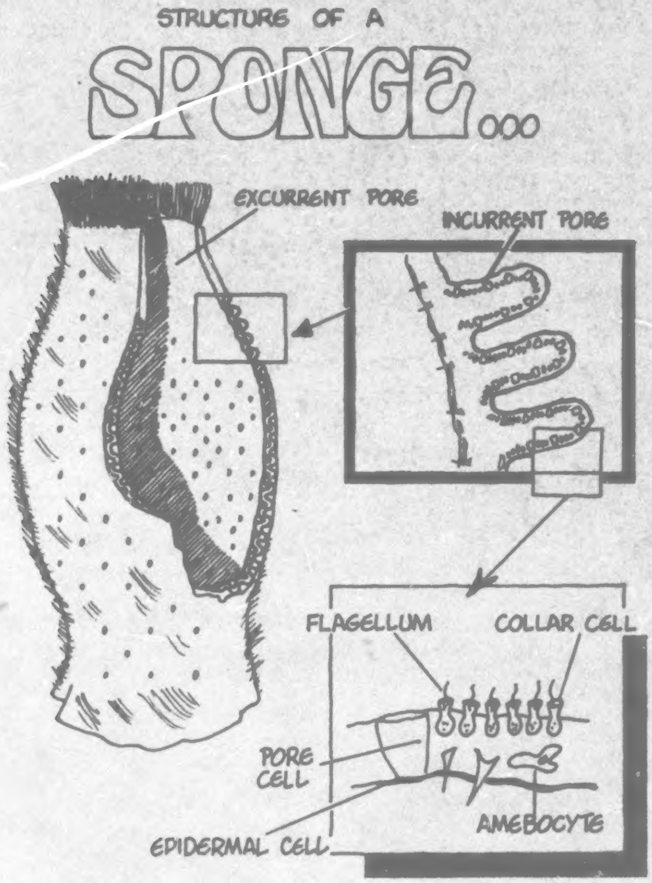
- The COLLAR CELLS wave their flagella in unison, setting up an imaginary current of water which drags the unsuspecting FOOD PARTICLE through the incurrent PORE CELLS.
- Once inside the sponge, the FOOD PARTICLE is ingested and digested by a COLLAR CELL.
- The digested FOOD is taken by an AMEBOCYTE and distributed to the COVERING CELLS, PORE CELLS and EGG CELL.
- The undigested portion of the FOOD PARTICLE is dumped by the AMEBOCYTE into the central cavity.
- COLLAR CELLS beat their flagella again to create a current which will sweep the waste material out through the excurrent pore.

4 Repeat the simulation procedure so that the rest of the students in the class may participate.

5 Invite the students to perform additional simulations in which one or more of the structures within the sponge malfunction or are unable to carry on their special jobs. Have the remaining "cells" in the sponge explain how they depended on the ailing or absent cells and the effect this loss will have on their own functions. What could happen if:

- The COLLAR CELLS lost their flagella?
- The SPICULES disintegrated?
- The PORE CELLS become blocked?
- The AMEBOCYTES died?
- The COVERING CELLS were removed?

6 Provide all the students with a copy of the following diagram of the internal structure of the sponge for reference. Have them describe the specialized cells, their functions, and how these cells relate to each other within this simple organism. They should now be able to define "interdependence" and to offer other examples of this relationship operating within other animals.



7 After providing the students with specific examples of interdependence operating between the sponge and its biotic and abiotic marine environment, encourage them to relate and contrast this level of interdependence with that level occurring within the sponge organism.

RELATED ACTIVITIES:

- Select another invertebrate (hydra, planaria, earthworm, etc.) and study the specialized cells contained within its structure. Devise a simulation similar to the sponge activity and explain interdependence as it operates within the organism.
- Relate and compare the interdependence within the organism in the previous question to its biotic and abiotic environment.
- Simulate the components of a complete "ecosystem" (desert, forest, pond, etc.) to emphasize the interdependence concept.
- Compare what you have learned about interdependence within simple organisms and between them and their environs with interdependence as it is manifested in the human body, in a human family, and in a human community.

RESOURCE MATERIALS:

Buchsbaum, Ralph. Animals Without Backbones. Chicago: University of Chicago Press, 1969.

Fitzpatrick, Frederick, et al. Living Things. New York: Holt, Rinehart and Winston, 1970.

Otto, James, and Albert Towle. Modern Biology. New York: Holt, Rinehart and Winston, 1963.

SCIENCE (7)

Dead as a Dodo

SYLLABUS REFERENCE: Science 7, 8, 9, Block C, Living Things Around Us; *III. Ecology, C.*, pp. 56-58.

ENVIRONMENTAL REFERENCE: Natural Environments: Endangered species

OBJECTIVES:

- To define the terms "extinction" and "endangered species"
- To describe the specific causes(s) of the extinction of any one species and the resultant effect(s) on the environment
- To explain the purpose of wildlife management

PROCEDURES:

1 Ask students to explain the difference between "extinction" and "endangered." Identify extinction as a process through a discussion of the history of the dodo. Discuss the manatee as an example of an endangered species. The videotape of Jacques Costeau's "The Forgotten Mermaid" is an excellent visual documentary on the manatee.

2 Divide the class into pairs to research and prepare lists of extinct and endangered species for reference.

3 Explain the concept of a need for wildlife management and emphasize that this practice can mitigate the threat which man, through his carelessness and lack of concern, poses to wildlife. Discuss whether or not man's environmentally destructive practices and lack of concern for the environment in general could lead to his own extinction.

4 Provide individual students with the worksheet Dead As a Dodo and Absent As an Auk. (See page 83.) Direct them to complete the exercise, working independently. When this has been done, ask them to share with the class how they would prevent the extinction of their "favorite" species.

5 Instruct the students to produce a radio show interview with the last surviving member of an extinct species. To do this they must:

- Choose a partner with whom to work.
- Select an extinct creature species.
- Research this extinct species to learn information about its appearance, habitat, usefulness, causes for extinction, etc.
- Select the role to be played in the radio program: the interviewing reporter or the last survivor of the extinct species.
- Prepare a script for the radio show.
- Begin the interview by using radio station call letters, an appropriate theme or melody, an introduction of the radio announcer or on-the-spot reporter, and a variety of animal noises and sound effects. Remember to include interview questions which emphasize the great loss created by extinction and the role that humans have played in the process. The school's multimedia coordinator may be asked to assist in this step of the project.
- Conclude the interview by making a comment on how the deplorable situation the lonely creature finds himself in could have been avoided through wildlife management.
- Rehearse the script several times until both participants are sure of the dialog, then present it to the rest of the class during a practice session.

DEAD AS A DODO AND ABSENT AS AN AUK

Extinction

1. Define the term extinction.

____

____

2. List four threats to wildlife that could lead to extinction.

(a) ____
(b) ____
(c) ____
(d) ____

3. List six extinct species.

(a) ____________________ (d) ____________________
(b) ____________________ (e) ____________________
(c) ____________________ (f) ____________________

4. Name two extinct species and explain how man could have prevented their extinction.

(a) ____

____

(b) ____

____

Endangered Species

1. Define the term endangered species.

____

____

2. List six species on the endangered list.

(a) ____________________ (d) ____________________
(b) ____________________ (e) ____________________
(c) ____________________ (f) ____________________

3. Explain what is meant by wildlife management.

____

____

4. Choose your favorite endangered species and suggest at least three things that you can do to help prevent its extinction.

(a) ____
(b) ____
(c) ____

- Perform the interview perfectly during the actual cassette recording session.

- Listen to the completed product and decide if the interview would help others become more aware of extinction and more concerned about wildlife management in the future.

- Play the tape for other classes and disuss the subject with them.

RELATED ACTIVITIES:

- Suggest that the students actually carry out one of the activities proposed by them to prevent the extinction of endangered species.

- Produce a similar radio show interview with a "talking" endangered plant.

- Construct cartoons and posters for the classroom and school to depict the demise of a now extinct species and the plight of endangered ones. An illustration for a poster is shown on page 85.

RESOURCE MATERIALS:

Allen, Durward L. Our Wildlife Legacy. New York: Funk and Wagnalls, 1962.

The Forgotten Mermaid (Jacques Cousteau). 60 min. color. Metromedia Producers Corporation, 485 Lexington Avenue, New York, N.Y. 10017.

Lathrop, Dorothy P. Let Them Live. New York: Macmillan, 1951.

McClung, Robert M. Lost Wild America. New York: Morrow, 1969.

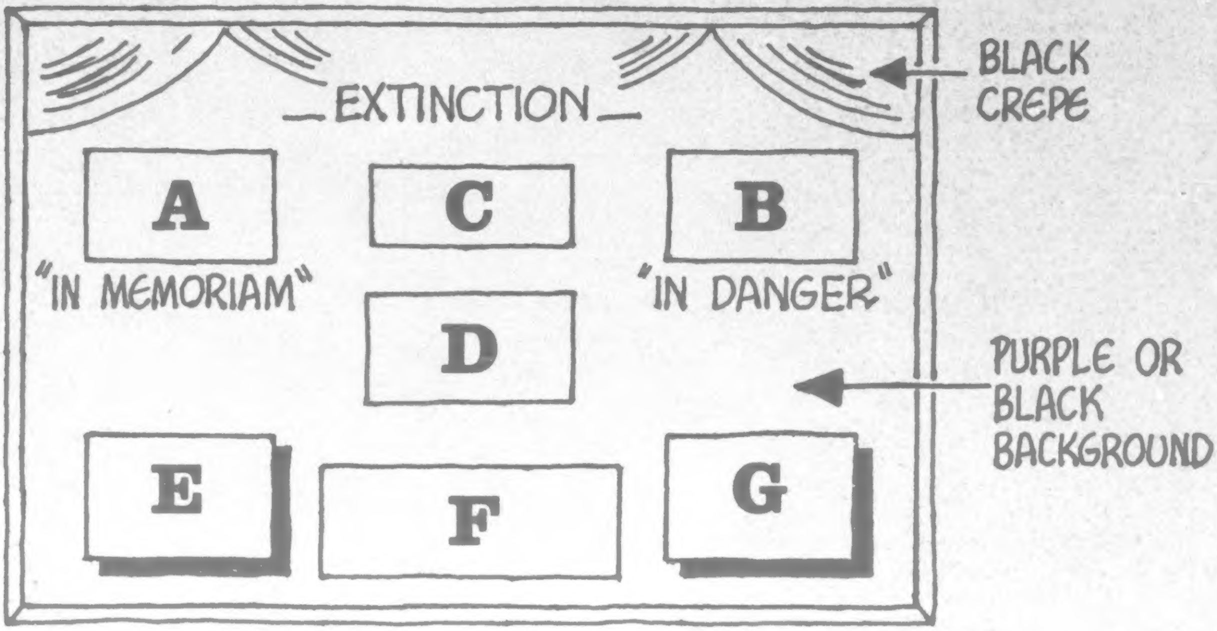
Perry, Bill. Our Threatened Wildlife. New York: Coward-McCann, 1969.

Pinney, Roy. Wildlife in Danger. New York: Duel, Sloan and Pearce, 1966.

Silverberg, Robert. The Auk, the Dodo and the Oryx. New York: Cromwell, 1967.

BULLETIN BOARD DISPLAY FOR

DEAD AS A DODO
ABSENT AS AN AUK



A. THESE BIRDS ARE EXTINCT—*PAGE 32*
B. THESE BIRDS MAY BE NEXT—*PAGE 33*
C. KEY TO NAMES OF ANIMALS IN D
D. *NATIONAL WILDLIFE ENDANGERED SPECIES*
APRIL · MAY 1974 ISSUE COVER
E. PICTURES AND NAMES OF EXTINCT ANIMALS
F. PICTURES AND NAMES OF EXTINCT and ENDANGERED SPECIES
G. PICTURES AND NAMES OF ENDANGERED SPECIES

Waste Removal

SYLLABUS REFERENCE: Science 7, 8, 9, Block J. The Chemistry of Matter; *The role of Chemistry in Society*, p. 66.

ENVIRONMENTAL REFERENCE: Solid Waste: Recycling, Recovery, Disposal Methods, Source reduction (packaging)

OBJECTIVES:

- To acquire a more concise understanding of the processes involved in an effective ecological upkeep of populated areas
- To stress the importance of health and environmental standards
- To develop theoretical and practical knowledge of the need to consider the natural, social, and environmental factors and consequences of our lifestyle
- To suggest effective uses of waste products to reduce the drain on resources

PROCEDURES:

1 Divide the class into three committees to investigate each of the following waste removal problems and report to the class.

Committee #1: Garbage Disposal

- Visit apartment buildings, stores, and schools to inquire about methods of disposing of garbage. What is thrown away and how? How do disposal methods work? Which ones are more effective for what types of problems? How complete is the disposal?
- Contact the local sanitation department and ask what is done with large quantities of garbage. Discuss the pros and cons of the system and any alternatives that exist.
- Write to the sanitation department of a large city and inquire about their methods of garbage disposal. What are the city's major disposal problems? How does its system fit its needs and how does it differ from the method used in your community?
- Research the history of sanitation systems and show how disposal methods have changed with the changing needs of our society.
- Make a list of the kinds of items thrown away in your home. Check the various ways of home garbage disposal. What method do you have and which is most effective? How can you improve your system?

Committee #2: Sewage

- Of what does sewage consist? Research the various methods of sewage removal. What types are used where and why? What type does your community have? Is it efficient? How can it be improved?

- Visit the nearest sewage treatment plant and learn the treatment process. Why is treatment necessary? Was sewage always treated? If not, when did treatment become necessary? Why?

- Contact your local health department for ordinances and laws regulating sewage disposal. Why are they necessary? What are the dangers of improper waste removal? How are the regulations enforced?

- Find out how sewage was dealt with a century ago. What were the advantages and disadvantages of that form of disposal, and what factors necessitated the change?

- Look up current articles on sewage disposal and treatment. What are the present issues? How are legislators and scientists dealing with them?

Committee #3: Nature's System of Waste Removal

- Define the term "biodegradable" and discuss the process. Why has it become such an issue? Find out the time period for biodegradation of the following materials: paper, plastic, cotton, glass, protein (plant and animal life), styrofoam, wood, nylon, coal, steel. Which are natural elements and which are synthetic? Which are faster to biodegrade? Of the slow ones, what is the primary chemical component and why are they slow? How do climatic conditions affect this process?

- Learn about the process of decomposition and decay in plants and animals. What happens and why? Is this nature's form of recycling?

  -Research animals and plants which live off decaying matter.
  -Determine what kinds of decay are important in each season of the year and why.
  -Discuss the importance of decay for various geographical climates and areas: forests, deserts, tropics, etc.

- Discuss how people have interfered with nature's process of "cleaning up." How are we preventing or delaying this process? What ultimate effects will this have on our environment?

RELATED ACTIVITIES:

- At the completion of the committee work, discuss with the class how the results of their investigations will change their personal and familial habits.

- Have students investigate ways that corporations and industries are polluting the environment through improper waste removal. Write to these businesses expressing your opinion.

- By scanning supermarket shelves, list products or parts of products which are not biodegradable. How can we avoid buying them? Is there any one company which produces largely biodegradable or largely nonbiodegradable items?

- In your own home, list the biodegradable and nonbiodegradable items you use. How can you replace those which are injurious to the environment? (Remember to refer to package labels.)

- What kinds of plants may provide natural deodorizers? Make a scrapbook with pictures and descriptions of these plants. Which ones grow in your neighborhood?

RESOURCE MATERIALS:

Burn, Bury Or What? 19 min. color. Stuart Finley, Inc., 3428 Mansfield Road, Falls Church, Virginia 22041.

Garbage. 10 1/2 min. color. BFA Educational Media, 2211 Michigan Avenue, Santa Monica, Ca. 90404.

"Garbage: Where Does It All Go?," Newsweek, December 25, 1972, pp. 65-67.

Schiller, R. "Recycling: Answer To Our Garbage Predicament," Reader's Digest, March 1972, pp. 171-172.

"Solid Waste Removal," American City, April 1972, p. 8.

The Stuff We Throw Away. 22 min. color. Stuart Finley Inc., 3428 Mansfield Road, Falls Church, Virginia 22041.

Vaughan, R.D. "What To Do With Your Six Pounds of Garbage Every Day," Today's Health, June 1972, pp. 44-47.

SCIENCE (7-9)

Energy Loss

SYLLABUS REFERENCES: Science 7, 8, 9, Block I, Forces At Work; *II. Forces and Work*, p. 22 [5.]; The General Science Handbook, Part 2, *Activities 3317-3333*, pp. 81-87.

ENVIRONMENTAL REFERENCE: Energy: Power generation

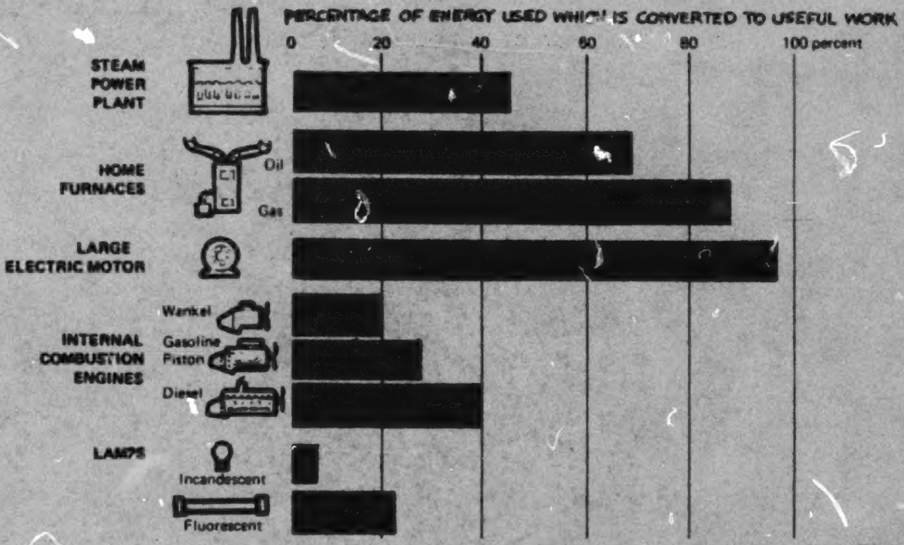
OBJECTIVE:

- To recognize that the waste in energy generation and transmission has an impact upon the environment

PROCEDURES:

1 Review with the class the scientific definition of efficiency. Duplicate, or make a transparency of, the graph below. Discuss what happens to most of the energy which is wasted.

How much energy is lost



2 Ask students to speculate about several ways in which communities or utility companies could increase the efficiency of electrical generating plants and transmission systems.

3 Plan with the class a science fair with the theme, "Using Our Dwindling Resources More Efficiently." The exhibits should represent such areas as energy generation, insulation in the home, home heating systems, industrial processes, and transportation. Encourage imagination and creativity in the design of systems which might be used in the average household.

4 Discuss the following with the class:

- How does the substitution of electricity for fuels such as coal and gas affect the use-efficiency of our natural resources?
- What adverse environmental effect does the waste heat from a nuclear plant have on the water into which it is discharged?
- Which is the least efficient of the items shown on the graph? Why?
- Using the graph and the knowledge that the average American home uses 18 percent of its total electrical consumption (kilowatt-hours) annually for lighting, assess the economic waste involved. (Have students ask their parents, or telephone the local utility company, to determine what the cost is per kilowatt-hour.)

- What might happen to the Hudson River Valley area if the temperature of the Hudson River were increased to 37° Celsius and maintained at that temperature over a period of time?

- What is the reading on a laboratory thermometer when held next to a 40-watt bulb? A 60-watt bulb? A 100-watt bulb? How can this heat loss cause further energy waste during the summer?

RESOURCE MATERIALS:

Council on Environmental Quality. Energy and the Environment-Electric Power. Washington: Government Printing Office, 1973.

SCIENCE (7-9)

Combating the Energy Shortage

SYLLABUS REFERENCES: Science 7, 8, 9, Block H, Weather and Climate; *III. Energy and Motion in the Atmosphere,* pp. 20-24. Science 7, 8, 9, Block K, Energy at Work; *V. Heat and Its Effect on Matter,* pp. 50-58.

ENVIRONMENTAL REFERENCE: Energy: New systems and concepts

OBJECTIVES:

- To relate the current energy shortage to the Law of Conservation of Energy
- To examine how energy is used in daily life
- To develop a better understanding of the present energy crisis
- To investigate the use of solar energy as an alternate source of energy

PROCEDURES:

1 Explain the Law of Conservation of Energy: Energy cannot be created or destroyed by ordinary means; it can only be changed. State several examples. Ask students if they think there is an energy shortage. Discuss the following:

- What are our main sources of energy?
- How many different forms of energy do we have? Give examples of each.
- What happens to energy when it is used?

- In what ways does the demand for energy increase?
- Are we using up all of our energy resources in America? In the world?
- What are the main sources of energy in your home?
- How are these main sources used?
- What changes have taken place in your house that increased your family's need for energy? What changes would cause a decrease?
- During a national energy crisis, what steps could you take to reduce energy consumption?

3 Choose one or more of the following topics and conduct a panel discussion.

- Contrast the energy shortage with man's ability to wisely use the available energy.
- There is no energy shortage, only an intelligence shortage.
- Scientific advances or technological breakthroughs could solve our energy crisis.

4 Have students measure the energy of the sun using direct sunlight on a thermometer. Compare this with sunlight concentrated on a thermometer through a lens, then through a curved mirror. Record temperature at regular intervals. Then discuss the following:

- Which thermometer recorded the highest temperature? Why?
- What implications does this information have for the use of the sun as an energy source?

5 Paint or line the inside of two shoe boxes, one black and the other white. Place a thermometer in each box in the shadow of a side. Cover each box with glass. Position the two boxes in the sunlight and record the temperatures of each thermometer at regular intervals. Then discuss the following:

- Which thermometer recorded the highest temperature? Why? Explain.
- What implications does this have for the use of heat collectors as an energy source?

RELATED ACTIVITIES:

- Set up an "energy commission" (a panel of students) to develop ways to conserve energy in the school, homes, and community.
- Set up a panel to forward suggestions of the "energy commission" to the student council, principal, elected officials, and parents in the community.

- Write to the various energy commissions at the local, state, and federal levels for information on solar energy and its uses.

- Have students construct a model of a house that could be heated with solar energy. Give specifications.

RESOURCE MATERIALS:

Citizens' Advisory Committee on Environmental Quality. Citizen Action Guide to Energy Conservation. Washington, D.C.: Government Printing Office, 1973.

Energy - Today - Tomorrow - Future. 160 slides, 5 movies. National Fuel Gas, Energy Consultant Services Division, Buffalo, New York 14203.

Hammond, Allen, et al. Energy and the Future. Washington, D.C.: American Association for the Advancement of Science, 1973.

Perus, Bruce. "Those Ingenious Exotic Fuels," The Sciences, June 1973, pp. 6-11.

SCIENCE (7-9)

The Role of Trees in Our Environment

SYLLABUS REFERENCE: Science 7, 8, 9, Block C, Living Things Around Us; *II. Survival of Living Things*, pp. 20-24; *III. Ecology*, pp. 38-58.

ENVIRONMENTAL REFERENCE: Resources: Renewable, Forests

OBJECTIVES:

- To become aware of the major concentrations of trees (forests) in our state

- To identify the dominant species of hardwood and/or coniferous trees in these forests

- To generally explain how the basic tissues of a typical tree carry on the functions of life

- To list the major products of trees in our state

- To cite ways by which the forests of our state can be protected and preserved

- To state the ways in which trees benefit our environment

- To better appreciate the aesthetic value of trees and to more seriously value our dependence upon them for survival

PROCEDURES:

1 Introduce the students to the forests of the state through the study of relief or topographic maps. Define the following: forest; hardwood, deciduous, and broad leaf trees; softwood, coniferous, evergreen, and needleleaf trees; mixed forest; forest belt; stratification; canopy; and profile. Provide the students with identification handouts depicting the major characteristics of dominant hardwoods and softwoods inhabiting the immediate area.

2 Conduct a field study at a nearby forested area to observe the previously described "structure" of a typical forest.

- Is this forest deciduous, coniferous, or mixed? Upon what did you base your decision?
- How is this forest stratified?
- How have light, moisture, temperature, soil, and wind influenced the development of this concentration of trees?
- Where in the forest is the greatest diversity of life?
- What forms of wildlife inhabit the forest?
- Is this a natural (succession) or a reforested (plantation) concentration of trees? How can you tell?
- Locate the forest on a map in respect to the other forests in the state.

3 Show the students how to identify and collect leaf and branch samples of the dominant trees by using their identification handouts.

4 Upon returning to the classroom, instruct students in the preparation of pressed, mounted, and labelled specimens of the collected tree samples. In addition, encourage a group of students to construct a three-dimensional basic model of the forest area visited. Use the model and tree specimens to emphasize and to summarize the concepts and definitions encountered thus far.

5 Briefly explain to the students how the basic tissues (root, stem, leaf, and flower) carry on the essential functions of life. Have students observe under the microscope prepared slides of a typical young tree root, stem, and leaf tissue. Specifically identify root hairs, xylem and phloem cells, palisade and spongy cells, and guard cells around stomate openings. Associate the following life functions of the tree with these structures and the main parts of a tree: support, absorption, transport, photosynthesis, transpiration, respiration, growth, and reproduction. Discuss the relationship of each function to the appropriate structure(s).

6 Obtain a large cross-section of a tree trunk. Locate sapwood, heartwood, bark, cambium, xylem, phloem, rays, annual rings, and pith. Discuss how these structures serve the tree.

7 Indicate which of the aforementioned life functions benefit other forms of life and the surrounding environment.

- How can a forest influence the climate of the immediate environment?

- How are the oxygen, carbon, and water cycles related to the life functions of trees?

- Why is the humus formed from decaying leaves and dead trees important?

8 Direct the students to visit a library to determine the products derived from trees in their state. Their lists should include the following:

-construction lumber
-veneer products
-paper and allied products
-fuelwood
-posts
-utility poles
-Christmas trees
-maple syrup
-fruit and nut products
-distillation products

Prepare a chart linking these products with the producing trees.

9 Invite tree specialists such as a representative of the Department of Environmental Conservation (Lands and Forest Unit), a lumberman, a forest ranger, and/or a tree surgeon to the classroom. Divide the students into groups to prepare questions such as the following for discussion:

- What is forest management? Explain sustained yield, block cutting, plantation, and reforestation.

- What is the function of a woodlot? A lumberyard?

- What are the technological developments that have improved and facilitated the lumbering industry during the past 10 years?

- What state legislation has preserved and protected our forests or improved the land? (Hewitt Act of 1929 in New York, for example.)

- What are the major insect threats to the trees of our state today? Name the controls proven effective. (Gypsy moth in New York, for instance.)

- What is the attitude of lumbermen toward forest conservation?

- How do forest fires affect the maintenance of the state's forest areas? Has this recently changed? If so, in what way?

- Describe the role and life of a lumberjack; a forest ranger.

- What is the general status of the forests in our state as of this year?

- How effectively are the forests of the state used for recreation? Will they survive the onslaught of the human population? Explain.

RELATED ACTIVITIES:

- Contrast the conditions for life in the tundra with those in the temperate forest.

- Simulate a forest land controversy between a lumberman and forest conservationist.

- Visit a forest-managed woodlot.

- Make a list of the many uses of wood pulp.

- Organize a drive to collect and recycle waste paper.

- Visit a lumberyard to ascertain the sources and destinations of the timber used.

- Visit a furniture factory to determine the types of trees used and the process employed to convert trees into furniture.

RESOURCE MATERIALS:

Conservation and Our Forests. 15 min. color. Syracuse University Film Library, 1455 East Colvin Street, Syracuse, New York 13210.

Edlin, Herbert L. *Wood Identification*. New York: Viking Press Inc., 1969.

Forestry Map (Publication M-5154). U.S. Department of Agriculture, Division of Publications, Office of Information, Washington, D.C. 20250.

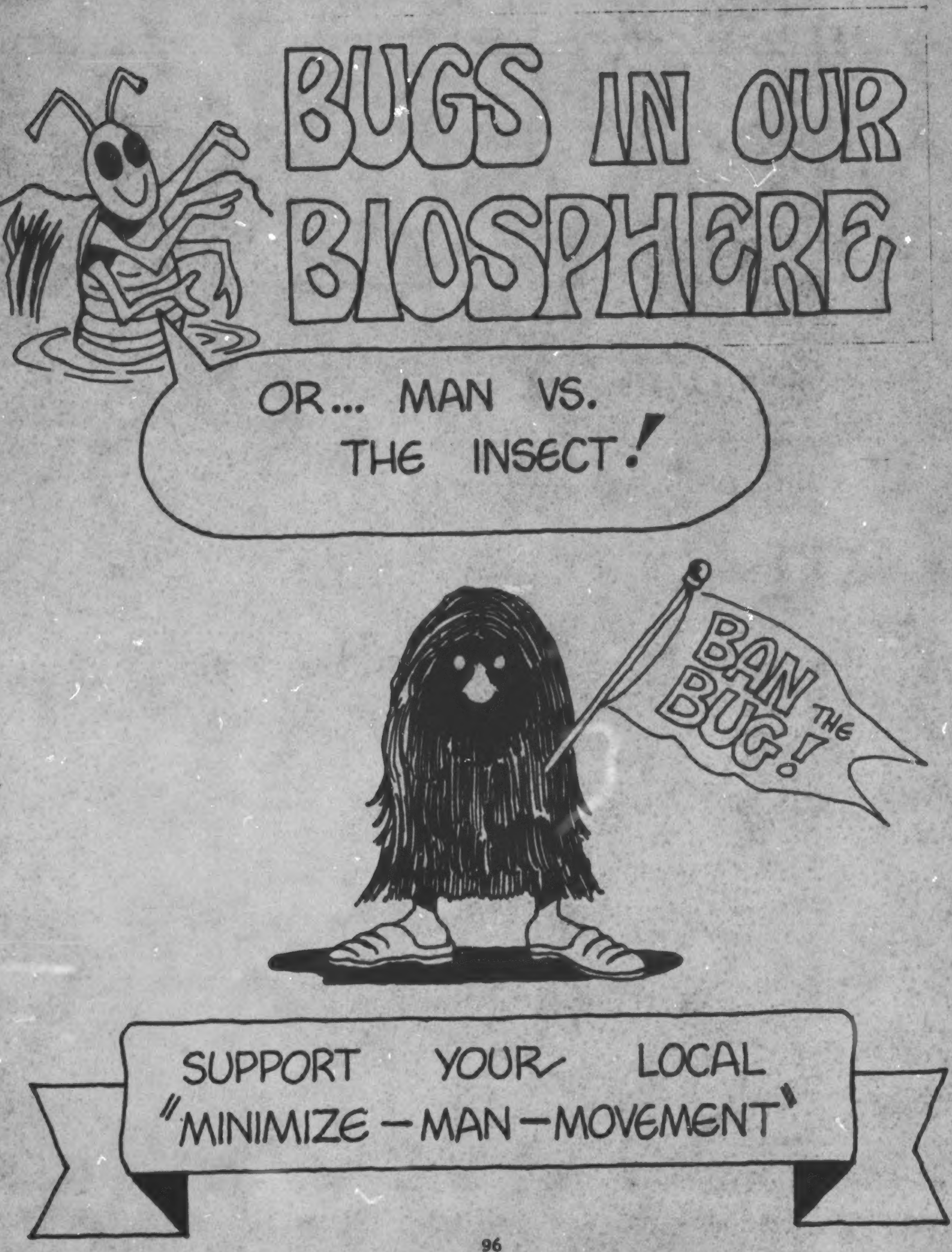
Harrison, C. William. *Forests*. New York: Julian Messner, Inc., 1969.

National Parks. U.S. Department of the Interior, National Park Service, Washington, D.C. 20240.

Timber World Resources and Reserves. National Forest Products Association, 1619 Massachusetts Avenue, N.W., Washington, D.C. 20036.

What Is A Tree? 7 min. color. Precedent Films, Inc., Gaylordsville, Ct. 06755.

Wood: The Renewable Resource. National Forest Products Association, 1619 Massachusetts Avenue, N.W., Washington, D.C. 20036.


BUGS IN OUR BIOSPHERE
OR... MAN VS. THE INSECT!
BAN THE BUG!
SUPPORT YOUR LOCAL "MINIMIZE-MAN-MOVEMENT"

SCIENCE (7-9)

Bugs in Our Biosphere

SYLLABUS REFERENCE: Science 7, 8, 9, Block C, Living Things Around Us; *I. C., 6. a., Kinds of Living Things*, p. 18.

ENVIRONMENTAL REFERENCE: Chemical, Biological, and Radiological Contamination: Pesticides, Pests

OBJECTIVES:

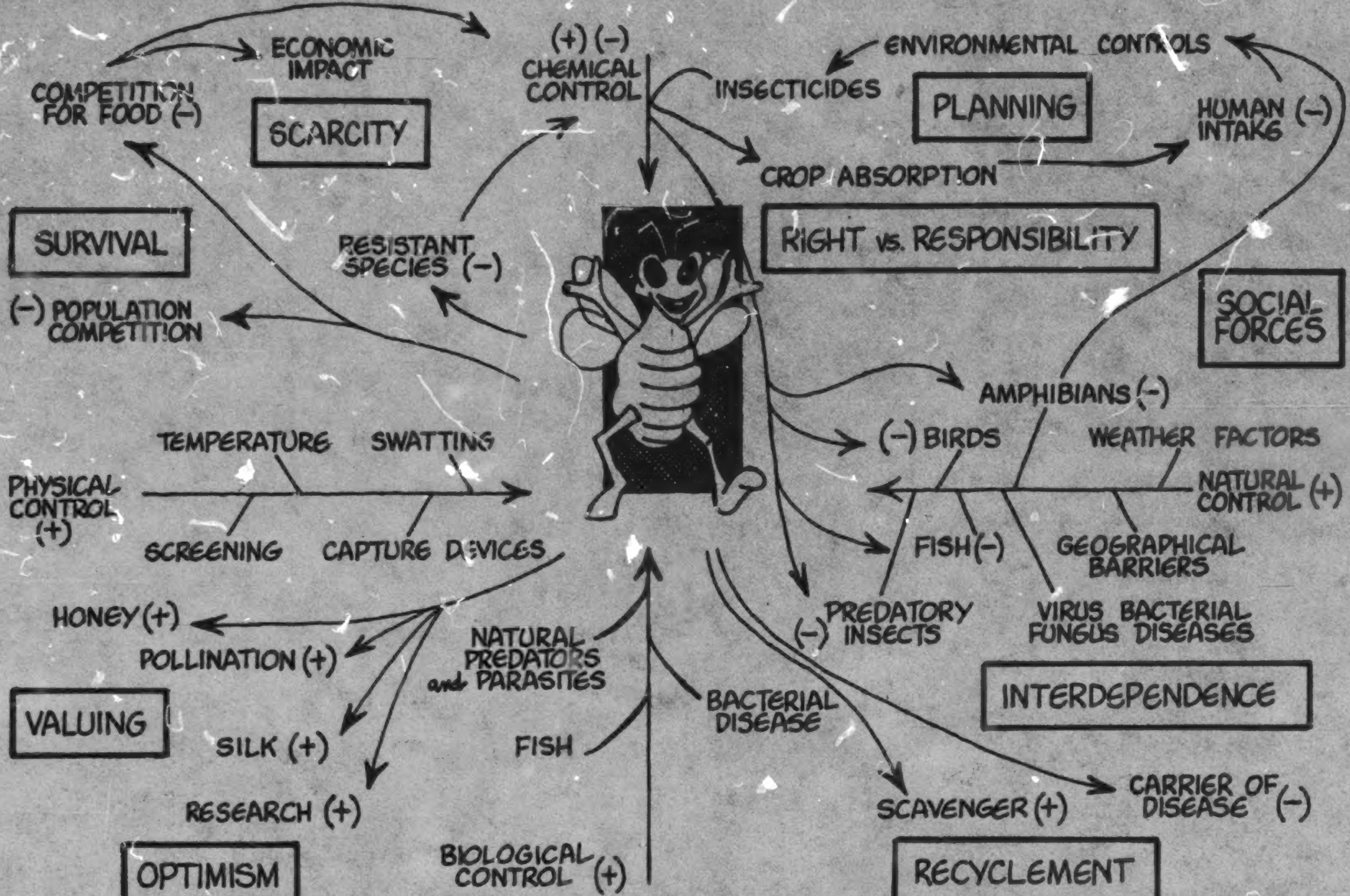
- To define environmental concepts
- To illustrate interdependence, survival, competition, scarcity, and recyclement by using examples from the insect world
- To discuss right vs. responsibility (or convenience vs. accountability) with respect to the insecticide problem
- To evaluate the insect control problem by using the concepts of valuing and planning
- To identify the social forces which can be used to help make insect control an environmentally safe and suitable process
- To optimistically predict the outcome of "man vs. the insect" and refute the premise that "insects will inherit the earth" by citing several examples of constructive environmental change attributable to insects
- To apply the students' knowledge of the environmental concepts to the other invertebrate groups by using the preceding insect activity as a model

PROCEDURES:

1 The insects and their arthropod relatives are normally introduced much later in a phylogenetic study of invertebrate animals. The teacher may wish to employ this model at that time or use it as an introductory motivational device for the study of all the invertebrates. The main purpose of this unit is to provide the life science teacher with a plan for integrating ecological terminology and environmental concepts into the regular instruction about invertebrates.

Show The Hellstrom Chronicle or a similar film to demonstrate the desperate competition between man and certain insects. After the showing, discuss the serious environmental threat posed by insects (in the film): that they will inherit the earth. Impress upon the students the need for greater awareness of and concern for the insect problem. Use the chart "Bugs In Our Biosphere" on p. 98 to facilitate discussion.

BUGS IN OUR BIOSPHERE



COMPETITION FOR FOOD (–)

ECONOMIC IMPACT

SCARCITY

(+) (–) CHEMICAL CONTROL

INSECTICIDES

ENVIRONMENTAL CONTROLS

PLANNING

HUMAN INTAKE (–)

CROP ABSORPTION

RIGHT vs. RESPONSIBILITY

SURVIVAL

RESISTANT SPECIES (–)

(–) POPULATION COMPETITION

SOCIAL FORCES

AMPHIBIANS (–)

(–) BIRDS

WEATHER FACTORS

NATURAL CONTROL (+)

PHYSICAL CONTROL (+)

TEMPERATURE

SWATTING

SCREENING

CAPTURE DEVICES

FISH (–)

GEOGRAPHICAL BARRIERS

(–) PREDATORY INSECTS

VIRUS BACTERIAL FUNGUS DISEASES

INTERDEPENDENCE

HONEY (+)

POLLINATION (+)

NATURAL PREDATORS and PARASITES

VALUING

SILK (+)

FISH

BACTERIAL DISEASE

RESEARCH (+)

SCAVENGER (+)

CARRIER OF DISEASE (–)

OPTIMISM

BIOLOGICAL CONTROL (+)

RECYCLEMENT

2 Provide the students with copies of Appendix D, Environmental Concepts, on page 208. After they have become familiar with the definitions, discuss as a class how each concept relates to the study of insects. Suggest that students be thinking about a concept each would be interested in illustrating.

3 Direct students to choose partners, then decide on a concept to be illustrated through a special project. Provide the students with copies of Project Ideas for Concept Areas for suggestions. Give them sufficient time to develop their projects in the classroom, in the library, and at home. To help students organize their projects, distribute copies of the Project Report Outline below. When completed, the concept illustration projects should be presented to class.

PROJECT REPORT OUTLINE

Student Names: ______________________________

____

Concept to be illustrated: ______________________

Describe activity or method to be used in concept presentation

____

____

____

Brief outline of steps involved: ________________

____

____

____

____

List at least nine questions that the class should be able to answer after your presentation.

1. ____
2. ____
3. ____
4. ____
5. ____
6. ____
7. ____
8. ____
9. ____

PROJECT IDEAS FOR CONCEPT AREAS

Survival: Present a slide-lecture production illustrating how protective coloration increases the chance for survival of many insects.

Interdependence: Design a card game based on predator-prey relationships of insects.

Scarcity: Plan a population density experiment using mealworms to illustrate that as numbers increase and food supplies remain constant, mealworm development is adversely affected.

Recyclement: Create a role-playing activity in which the scavengers of the insect world and their importance in the environment are shown.

Right vs. Responsibility: Develop an experiment showing the lasting effects of various hard insecticides on mealworms and an explanation of why soft insecticides are preferable.

Planning: Prepare a demonstration comparing different methods of insect control (mechanical control, chemical control, and biological control). Rate them according to environmental suitability.

Valuing: Conduct a simulated debate between a struggling-to-make-ends-meet farmer and an environmentalist.

Social Forces: Design a game entitled "The Economy Bug" in which pieces are moved around a board, encountering various ecological, economic, and political problems.

Optimism: Conduct a survey on how insects are helpful in the environment, and make a presentation of the results to the class.

Students should be encouraged to consider other environmental concepts and develop projects of their own design. Ask them to list any they find interesting.

RELATED ACTIVITIES:

- List the names of several insect species helpful to man. Explain how each is helpful.
- Suggest several ways to improve the environmental conditions which are hazardous to a particular group of vertebrates.
- Describe the specific characteristics of the main components of an ecosystem inhabited by members of one of the invertebrate groups.

RESOURCE MATERIALS:

Brown, Vinson. How to Explore the Secret Worlds of Nature. Boston: Little, Brown and Co., 1962.

Fabre, J. Henri. Insect Adventures. New York: Dodd, Mead and Co., 1967.

Harris, Reg. Natural History Collecting. New York: Grosset and Dunlap, Inc., 1972.

Hillcourt, William. Field Book of Nature Activities and Conservation. New York: G. P. Putnam's Sons, 1961.

Octopus, Octopus. 60 min. color. Metromedia Producers Corporation, 485 Lexington Avenue, New York, N.Y. 10017.

The Sea. 26 min. color. Syracuse University Film Library, 1455 East Colvin Street, Syracuse, New York 13218.

Stefferud, Alfred. Insects: The Yearbook of Agriculture. Washington, D.C.: U.S. Government Printing Office, 1952.

EARTH SCIENCE

Planned Land Use

SYLLABUS REFERENCE: Earth Science Syllabus; *Area 1; Investigating Processes of Change,* C., Environmental Change, p. 5.

ENVIRONMENTAL REFERENCE: Land Use: Planning

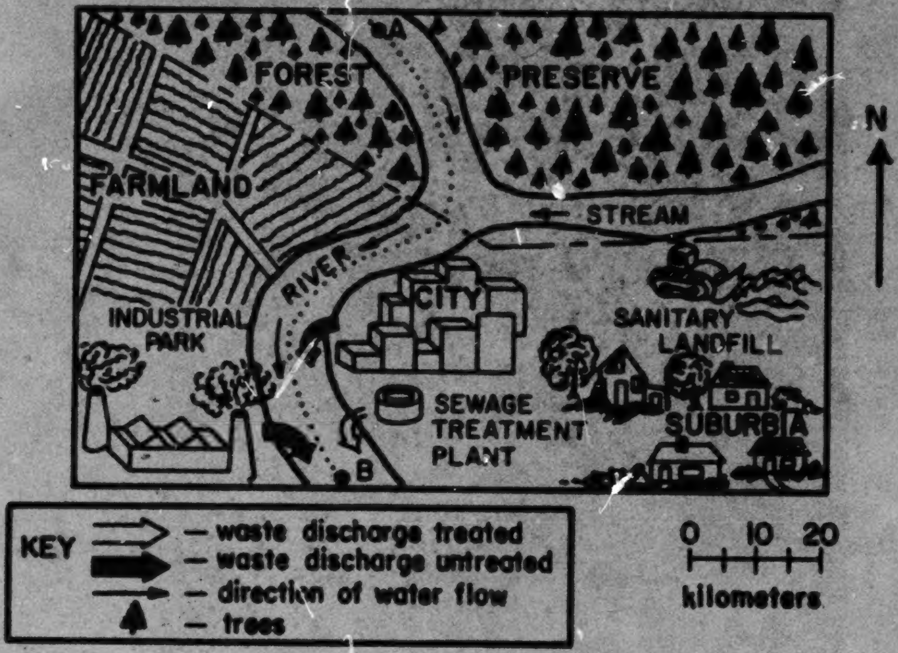
OBJECTIVES:

- To recognize that the limited nature of productive resources makes it imperative that a society define its economic objectives in terms of environmental reality
- To understand that good land use is the result of careful planning

- To recognize that soil, trees, and water are classified as renewable resources, but, because their renewal requires a major investment in time and effort, they may be more realistically considered depletable resources.

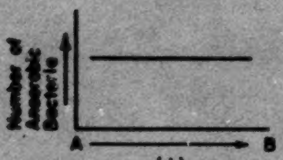
PROCEDURE:

1 Good land use planning is an important aspect of environmental conservation and improvement. Conduct a class discussion on planning practices with the aid of the map and questions given below.



- Does the map represent a well-planned area? Explain. What changes could be made to improve the area's environmental quality?
- Which landscape region has probably been altered least by the activities of man? Explain.
- What effect would a second industrial park have upon the environment?
- Should people living here support legislation to rezone this land to allow for a second industrial park? Why or why not? Give some advantages and disadvantages.
- What causes the change in the bacterial count between points *A* and *B*? Who has the responsibility for monitoring and, if necessary, remedying the condition?
- Compare the surface runoff rates during a 1-hour light rain of the four areas (forest preserve, suburban, city, and farmland) by arranging them in order from most to least runoff. Explain.

- **Which graph best represents the probable quantity of bacteria (anaerobic) along line *A-B* in the river? Explain.**



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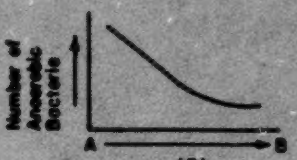

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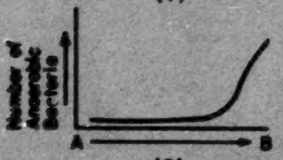

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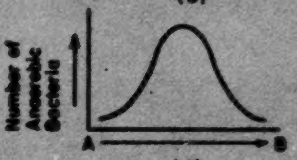
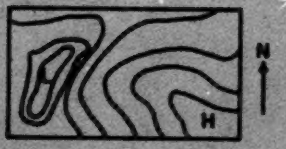


(4)

- **Which diagram best illustrates the probable air pollution field of this area at an elevation of 100 meters on a windless, spring afternoon?**



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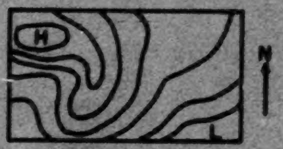

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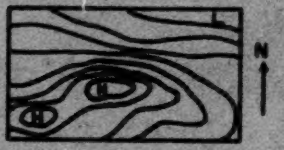

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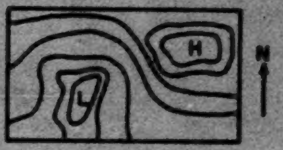


(4)

KEY:
H = High Pollution
L = Low Pollution

RELATED ACTIVITIES:

- What are the principal causes of air pollution? Who is responsible? What actions can the governmental agencies (and citizens) involved take to improve the quality of air? Explain in detail.

RESOURCE MATERIALS:

Cities of the Future. 30 min. color. Modern Talking Picture Service, 315 Springfield Avenue, Summit, New Jersey 07901.

The Conservationist. New York State Department of Environmental Conservation, Albany, New York 12201.

Naturalist. Natural History Society, 315 Medical Arts Building, Minneapolis, Minn. 55402.

No Deposit - No Return. 10 min. color. Centron Educational Films, 1621 W. 9th Street, Lawrence, Kansas 66044.

BIOLOGY

Material Cycles

SYLLABUS REFERENCES: Biology, *Unit 7 - Plants and Animals in Their Environment, II. Biotic Organization*, pp. 99-100 [c.1.b. (2)]; Biology: A Handbook of Activities, *Activities 2.12, 2.13*, p. 110 General Biology, *Understandings 27, 28; Activities 27.0-28.1*, pp. 15-16;High School Biology, BSCS Green, Student's Manual, Exercise 7.4, pp. 125-128.

ENVIRONMENTAL REFERENCE: Resources: Recycling

OBJECTIVES:

- To understand that the renewable resource base can be extended by recycling
- To recognize that natural resources are interdependent and the use or misuse of one will affect others

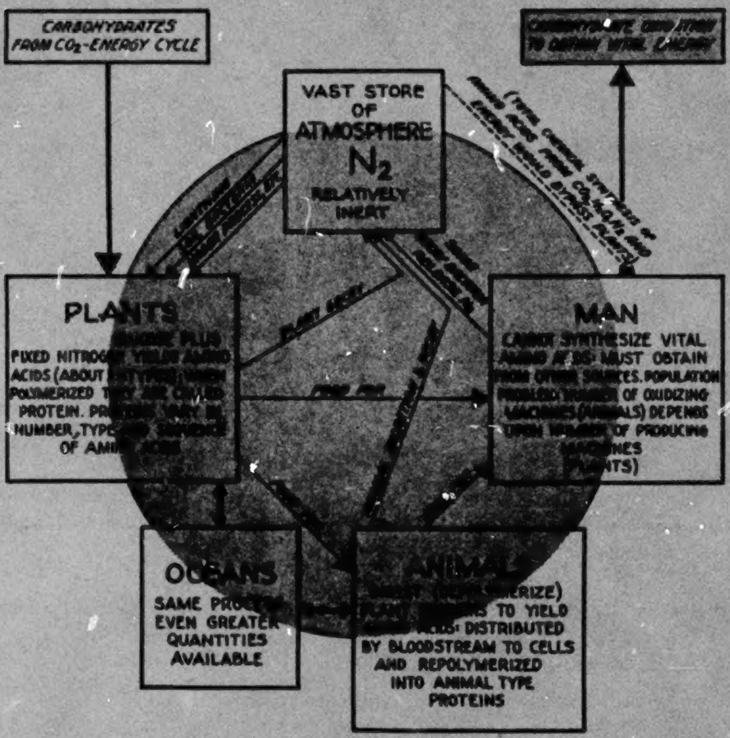
PROCEDURES:

1 Instruct members of the class to prepare illustrations of various Material Cycles which occur in an ecosystem. (Those which might be used are the Nitrogen, Oxygen, Carbon, Hydrogen, and Phosphorus Cycles.) Lead a general class discussion of materials cycles using the Nitrogen Cycle illustrated.

Ask the following questions pertaining to the Nitrogen Cycle.

- Why do animals (and man) need nitrogen?
- How do they obtain this nitrogen?
- Free nitrogen constitutes 78 percent of the air. Can this nitrogen be used by plants and animals? Explain.
- How do plants obtain nitrogen?
- Name some scavengers, decomposers, and saprophytes, and explain their role in the Nitrogen Cycle.

THE NITROGEN CYCLE



2 Further discuss the principle of recycling by considering the following.

- Does man effectively recycle materials he uses? Explain.
- In what ways may we achieve more efficient use of our resources through recycling?
- Select some form of recycling process conducted by man, and explain what steps approximate those roles performed by scavengers and decomposers in the Nitrogen Cycle.
- Why is it necessary that society become aware of the extreme importance of recycling?

RESOURCE MATERIALS:

The Conservationist. New York State Department of Environmental Conservation, Albany, New York 12201.

Environmental Education. Dembar Education Research Service, Box 1605, Madison, Wisconsin 53701.

A Search for Ecological Balance. 38 min. color. Film Images, 17 W. 60th Street, New York, N.Y. 10023.

This Vital Earth. 10 min. color. New Jersey State Museum, Film Loan Service, Trenton, New Jersey 08625.

BIOLOGY AND/OR GENERAL BIOLOGY

Recycling Laboratory Glassware

SYLLABUS REFERENCES: Biology; *Appendix III, Suggested Laboratory Exercises*, pp. 115-118 and/or General Biology; *Appendix A - Supplementary Information*, pp. 63-74.

ENVIRONMENTAL REFERENCE: Resources: Recycling

OBJECTIVES:

- To use broken laboratory glassware and glass tubing to make glass rings, bracelets, and other types of jewelry
- To construct a simple "microscope" from waste glass and other basic materials

PROCEDURES:

1 State and discuss the problem and objectives of this unit with the students.

2 Prepare materials for each student:

-a Bunsen burner
-a 3" x 5" card
-a file
-a pair of safety goggles
-a tapered toothpick
-two small rubber bands
-a tongue depressor with precut 1/2" hole at one end
-a pair of tongs
-prepared microscope slides
-glue and assorted pieces of broken, waste glassware and glass tubing

3 Demonstrate techniques for cutting, heating, fire polishing, bending, and possibly blowing, glass. Wear safety goggles while heating glass and inform the students that they must do likewise. Also, caution students not to touch a piece of heated glass for several minutes. If hot glass must be manipulated, use the tongs.

4 Allow the students some time to practice the aforementioned techniques. Then direct them to design and construct simple jewelry (rings, bracelets, medallions, pins, key rings, earrings, etc.).

5 Demonstrate the construction of a simple "microscope" from a piece of glass tubing. Draw a piece of glass tubing (approximately 1/16 inch in diameter) into a thin strand. Hold the strand in the Bunsen burner flame until a small bead of glass is formed. Glue a small, circular piece of the 3" x 5" card over the hole in the tongue depressor. When the bead of glass has cooled, break off the stem and glue the stem onto the card so that the glass bead covers the burned hole in the card. Place a prepared microscope slide on the tongue depressor on the side to which the glass bead and stem are attached. Attach the glass slide with rubber bands. Place a toothpick between the slide and tongue depressor. The toothpick will act as a guide for focusing the "microcope" on the slide specimen.

6 After distributing a handout outlining the previous procedural steps, allow students to construct a microscope.

RELATED ACTIVITIES:

- List other uses for glass which is normally discarded.
- Explain why waste glass is difficult to dispose of.
- In what ways can glass fragments of different colors be used to add to the beauty of our environment?
- Has this activity changed your attitude regarding the reuse or recycling of waste glass? How?
- Write to a company such as Owens-Illinois or Corning Glass Works requesting literature which deals with glass products and glass recycling.

RESOURCE MATERIALS:

"Chemical Pollution," Forbes, July 1, 1972, p. 19.

"From Bottles to Bricks," Science Digest, March 1972, pp. 66-68.

Hannon, B.M. "Bottles, Cans, Energy; Returnables, Throwaways and Recycling," Environment, March 1972, pp. 11-21.

Maloney, F. Terence. Glass in the Modern World; A Study in Materials Development. Garden City, New York: Doubleday, 1968.

Phillips, Charles J. Glass: Its Industrial Applications. New York: Van Nostrand Reinhold, 1960.

Robinson, D.A. "Glass - A Material for Today," Chemistry, July 1974, pp. 10-14.

Sattler, Helen R. Jewelry From Junk. New York: Lothrop, 1973.

"Turning Junk and Trash into a Resource," Business World, October 10, 1970.

BIOLOGY

Wildlife Habitats

SYLLABUS REFERENCE: Biology; *Unit 7 - Plants and Animals in Their Environment*, pp. 94-108.

ENVIRONMENTAL REFERENCE: Natural Environments: Habitats

OBJECTIVES:

- To compare manipulated and nonmanipulated habitats preserved for wildlife
- To consider how land can be preserved for wildlife and at the same time provide education and recreation for man
- To appreciate the role of local, state, and federal governmental agencies in the establishment and continuation of game preserves

PROCEDURES:

1 Provide students with background by showing two 16 mm. films. The first, "Multiply and Subdue the Earth," focuses on the decreasing availability of land for wildlife as well as the decrease in aesthetically pleasing forests and marshes for human recreation. The film stresses that man must learn to live in harmony with the environment rather than increase his numbers and physically conquer it. The second, "Cry of the Marsh," depicts the beauty of the natural wetland environment, then shows the destruction of the area through draining, burning, and development, and the subsequent death of many species of plants and animals.

2 Discuss the significance of both films with the students. Explain the interaction of various wildlife populations with their environment, emphasizing the irreplaceable nature of the environment.

3 Discuss the role of the state government in the establishment and continuation of game preserves. Have students plan and arrange field trips to manipulated and nonmanipulated wildlife refuges. Instruct them in the proper techniques for taking pictures for 2" x 2" slides and, if feasible, for making a movie with super 8 mm. film.

4 During the field trip to a nonmanipulated wildlife refuge, enlist a teacher-naturalist to instruct the students concerning the importance of a habitat, the methods employed in this state to preserve various habitats, and the need for developing new game preserves and nature centers. Encourage students, provided with cameras, to photograph habitats and characteristic features of the wildlife refuge.

5 Repeat the same field trip procedure to a manipulated wildlife refuge, noting in particular the differences between nonmanipulated and manipulated habitats.

6 Upon return to the classroom, direct students to write a summary of their observations and experiences on the two field trips. Form a committee to incorporate what they have learned into a meaningful sound slide presentation. Arrange for the development of the film and the production of 2" x 2" slides. The committee should view and select the slides for the presentation.

7 Instruct a second committee to prepare a script to accompany the final slide arrangement. Students may then "audition" for the role of narrator of the slide program.

RELATED ACTIVITIES:

- Why is it important to consider the type(s) of habitat prior to the development of a game preserve or wildlife management area?
- What roles do local, state, and federal governmental agencies play in the establishment and continuation of game preserves?
- How can natural areas be preserved for wildlife and still provide recreation and education for man?
- Should humans or wildlife have priority over the use of the land inhabited by wildlife? Explain.
- How can we hope to balance local land use priorities for ourselves and wildlife as well?
- Prepare a topographic map or scale model of an "ideal" manipulated or nonmanipulated wildlife refuge.

RESOURCE MATERIALS:

Cry of the Marsh. 12 min. color. State University of New York, College of Environmental Science and Forestry, Syracuse, New York 13214.

Helfrich, Harold W., Ed. The Environmental Crisis. New York: Yale University Press, 1970.

Multiply and Subdue the Earth. 67 min. color. State University of New York, College of Environmental Science and Forestry, Syracuse, New York 13214.

Murphy, Robert. Wild Sanctuaries - Our National Wildlife Refuges - A Heritage Restored. New York: Dutton & Co., Inc., 1968.

BIOLOGY

Wildlife Management

SYLLABUS REFERENCE: Biology; *III. Biosphere and Man*, pp. 104-108.

ENVIRONMENTAL REFERENCE: Resources: Wildlife management

OBJECTIVES:

- To define the terms population, density, and management
- To study the principles of wildlife management by creating a model of a wildlife system

PROCEDURES:

1 Distribute copies of Wildlife Dynamics (See Resource Materials, p. 112).

- What information is available about the white-tailed deer from the population charts?
- List the ways in which large game populations are counted.
- Define the word "population" as it is used in the article.
- Explain the picture captioned "starved deer means too few harvested."
- Explain how high density of numbers may result in a lower population.
- List the causes of high density stress.

2 White-tailed Deer Count Simulation. Provide teams of students with:

- A small container, labeled with the name of a New York State county, containing specific numbers of brown and/or white-colored beans.
- Data chart (See below.)

SAMPLE DATA CHART

County	Brown Beans (Bucks)	White Beans (Does)
Oneida	56	32
Madison	45	350
Oswego	118	228
Onondaga	337	169
Cortland	400	100
Cayuga	150	310
Lewis	66	0
Franklin	0	442
Jefferson	337	111
Herkimer	245	200
Broome	90	309
Tioga	118	274
12 counties	1,962	2,525

Prior to class, place the fixed numbers of brown and/or white beans into the containers. Explain to the students that they will participate in a simulation activity in which they will take a census of deer in several counties in New York State. Explain that each container represents a county in the State; brown beans will represent bucks and white beans will represent does (1/2 bean counts as one deer). They should assume they are taking an aerial census of deer during the winter when foliage cover is reduced and the deer congregate in herds.

Direct the students to count the different colored beans and to record the county buck-and-doe count on the data chart and on a master data chart on the chalkboard or overhead projector.

From the master data chart, answer the following:

- Should the hunting of white-tailed deer be restricted in any of the counties? What factors must be considered?
- If additional deer predators were introduced into Oswego county, what might happen to the deer population over a period of time?
- How could an increase in population density affect deer?
- Define the wildlife management problem in Lewis and Franklin counties. What action would you suggest to county officials?
- Offer an explanation for the census numbers in Oneida, Madison, Lewis, and Franklin counties. Investigate large game management practices and prepare a report outlining a suggested management program for those counties.
- Should deer be transported from one county to another? Justify your answer.
- Are white-tailed deer an endangered species in New York State? Explain.

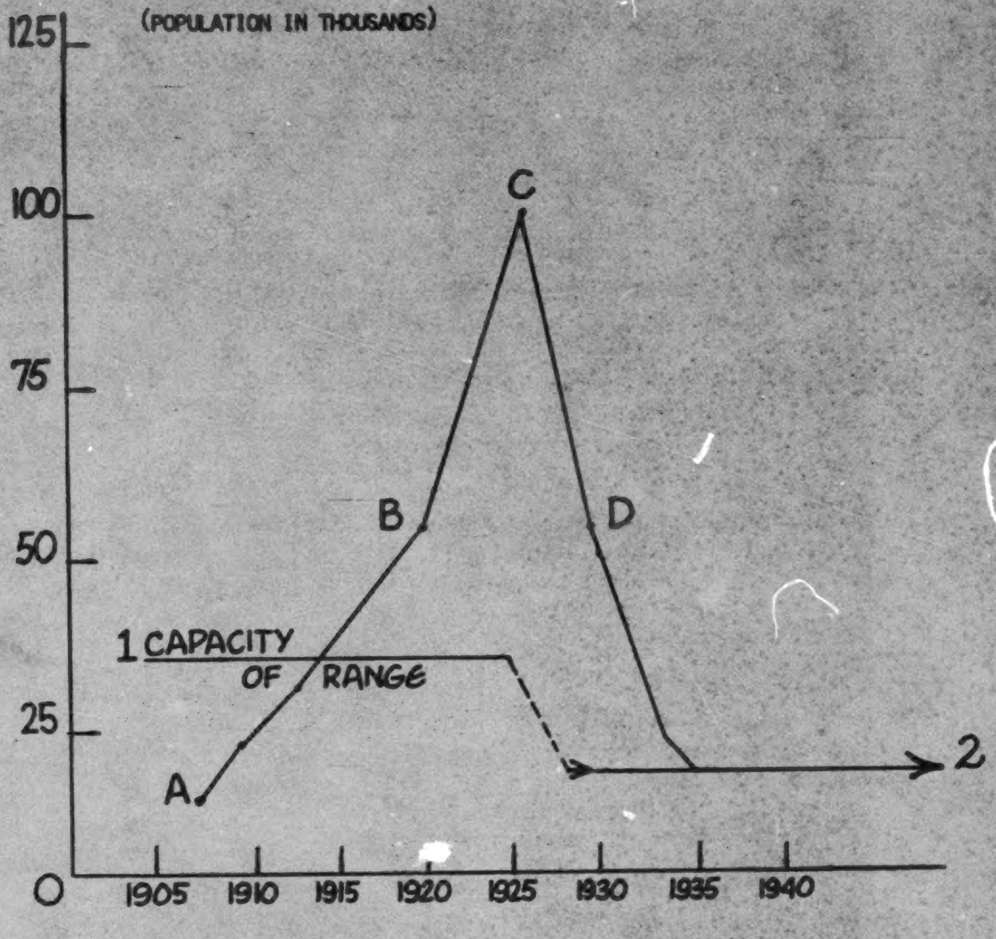
3 Invite a wildlife management consultant to discuss the master data chart and the questions related to it.

RELATED ACTIVITIES:

- Study the Kaibab Plateau population explosion problem as an example of the result of humans upsetting a natural predator-prey relationship. The Kaibab Plateau is near the Grand Canyon. Here, in 1907, there were 4000 deer and a substantial population of their predators, mountain lions and wolves. When an effort was made to protect the deer by eliminating the predators, the deer population increased tremendously. By 1925, there were 100,000 deer on the plateau, far too many for the supply of vegetation. The deer, in their search for food, damaged the vegetation markedly. During the next three winters large numbers of deer starved to death, and in time their numbers declined to about 10,000.

-What was man trying to accomplish?
-Why did his actions seem the most logical ones to take?
-Could you prescribe what should have been done on the Kaibab?
-What is the present situation on the Kaibab Plateau?

Present the following graph to dramatize the Kaibab Plateau deer population problem.



DEER POPULATION

- In conjunction with a math course, write a computer program which predicts the deer population after 10 years, 25 years, and 100 years.

RESOURCE MATERIALS:

Sheldon, William G. "Wildlife Dynamics," The New York State Conservationist, April-May, 1966, pp. 16-19.

GENERAL CHEMISTRY

Air Pollution Activities for the Unaware and Unconcerned

SYLLABUS REFERENCE: General Chemistry; *Area 6 - Environmental Pollution, III. Air*, pp. 128-134.

ENVIRONMENTAL REFERENCE: Pollution: Air; Particulates, Engine emission, Industrial effluent, Smog

OBJECTIVES:

- To list the three major sources of air pollution
- To state the effects of various air pollutants on human health, plant and animal life, and material things
- To compare natural and created sources of air pollution
- To compare photochemical smog with "London" smog
- To analyze the causes and effects of a temperature inversion
- To specify several methods of air pollution control in homes and industry

PROCEDURES:

1 Introduce the students to this unit by showing the 16 mm film, "Air Is for Breathing," available free from Shell Oil Company. The film explains the sources of air pollution and the harmful effects of air pollutants on human health. Direct the students to summarize the main points of the film. Conduct a general discussion on the following topics.

  - Responsibility of industry in preventing further environmental deterioration
  - Role of industry in developing new methods of production to prevent air pollution
  - Duties of health officials in establishing and enforcing standards to control air pollution
  - Ways in which individuals can assist environmental agencies in reducing air pollution

2 Introduce the students to a contract unit on air pollution similar to the example which follows. After explaining the contract requirements to the class, briefly discuss them with each student. When the students have decided the number of tasks they will complete for a certain grade, exchange signatures to make the contract binding. Explain to the students that the school library resources will be available to them during class time and that the teacher will meet them in the library to instruct them in the use of the facility, if necessary. Jointly decide the date for completion of the contract unit.

ENVIRONMENTAL STUDIES CONTRACT UNIT
(AIR POLLUTION)

DIRECTIONS: Please read all of the categories before you decide on any grade contract. Grades will be earned as follows:

GRADE 65: Required items only

GRADE 70-79: Required items plus one from each group

GRADE 80-85: Required items plus one from Group I, one from Group II, and three from Group III.

GRADE 86-89: Required items plus two from Group I, one from Group II, and three from Group III.

GRADE 90-100: Required items plus two from Group I, two from Group II, and three from Group III.

Within the grade range chosen, the exact grade will depend on the quality of the completed items. Items must be submitted for evaluation on or before the required date.

REQUIRED ITEMS

1. What is air pollution?
2. List the three major sources of air pollution and give at least two examples of each source.
3. State at least 10 negative effects of air pollution.

GROUP I: CREATIVITY

1. Make a poster on the subject, "Preventing Air Pollution."
2. Write a short story involving air pollution.
3. Make a photomontage showing the deterioration of the physical environment resulting from air pollution.
4. Take pictures of air pollution in your county and mount them on poster board. Include captions.
5. Write a poem about air pollution.
6. Make a tape recording of the sounds of the sources of air pollution.

GROUP II: WRITTEN REPORTS

1. Write a 500 word report on alternatives to the internal combustion engine for transportation.

2. Write a 500 word report on the effects of smog on human health.

3. Write a 500 word report on fossil fuels and the effects of burning these fuels on air quality.

4. Write a 500 word report on the effects of air pollutants on wildlife.

GROUP III: RESEARCH

1. Get the opinions of 10 adults on the severity of pollution and how it can be halted.

2. List at least five factors in your home which may contritute to air pollution, and explain how you can help to diminish air pollution at home.

3. Visit an organization which specializes in air pollution control, and ask a spokesman how industry can diminish air pollution.

4. Choose any five material things that you own, and explain whether the production of these items resulted in air pollution.

5. Interview a representative of the Heart and Lung Association, the National Tuberculosis and Respiratory Disease Association, or your family doctor to find out more about the effects of air pollution on your health.

6. Contact a local meteorologist and ask him to comment on the probable effects of air pollutants on our weather and climate.

THE CONTRACT

I, ______________________________ understand the
(signature)
conditions of this agreement and have decided to contract for the following grade: ____________. I understand that if this contract is not completed on the due date, that I shall be subject to a grade penalty for each day that my work is late. I also understand that if my work is completed prior to the due date, or if I successfully complete more work than I have contracted for, I may receive a bonus for my efforts.

(To be retained by student)

- -

DATE DUE __________ GRADE CONTRACTED FOR __________

STUDENT'S NAME ______________________________

TEACHER'S SIGNATURE ______________________________

(To be retained by teacher)

3 During the contract period (10 class periods suggested), present the following activities to motivate the students in their work and to provide them with background. Provide a factsheet including information about:

- a definition of pollution
- three major sources of air pollution (attrition, vaporization, and incomplete combustion) and examples of each
- natural sources of air pollution
- specific, man-generated air pollutants (sulfur dioxide, nitrogen compounds, carbon monoxide, ozone, lead, fluorides, and carbon dioxide), their sources and their effects.
- photochemical smog and "London" smog
- temperature inversions

- Show sound, color filmstrips "Air Pollution - Part I" and "Air Pollution - Part II" to illustrate the terms and definitions on the factsheet. Show the filmstrip "Atmospheric Pollution" to more clearly identify and describe each major air pollutant and to contrast "London" smog with photochemical smog.

- Provide students with samples of smog available in small glass bottles from school supply companies. Direct students to smell the smog, then place various objects in the bottles: rubber bands, nylon, paper, paper clips, and human hair. At the end of the class period, observe and record the effects of the bottled gases on the various objects removed from the bottles. Collect and discuss the results.

- Direct students to study, then carry out, the following procedure for the observation and estimation of the number of particles in "dirty" air.

  - Examine a clean glass slide with the low power of a compound microscope. Record any particles that you observe on the slide in a one-inch square area.
  - Tape the glass slide on a piece of white cardboard and spread a thin film of vaseline on the slide. Place the slide outside in an area of your choice. The slide should remain in the outside environment for 24 hours.
  - Bring the slide to class and examine it again with the low power of your microscope in one-inch square areas. Determine the particles per square inch using the chart below as a guide:

Particles Per Square Inch -- Over 20 Microns							
2,000	3,500	5,000	10,000	20,000	30,000	45,000	60,000

  - Collect and discuss the composite class results.

- Direct students to observe and estimate the density of black smoke by obtaining a Ringelmann or other similar smoke chart and viewing the smoke through the center section. With the sun at their backs, have students face the smokestack or chimney which they plan to observe. Holding the chart at arm's length, have them observe smoke through the center section and record the number that most closely approximates the shade of gray of the smoke. Collect and discuss the composite class results.

- Demonstrate the effects of ozone on plants and other materials. Ozone generators are available from school equipment suppliers.

- Demonstrate a temperature inversion using an inversion apparatus which is also available through school equipment suppliers.

- Direct the students to read two articles: "The Fog" by Berton Roueche, The New Yorker, Spetember 1950; and "Here Comes the Smog," Newsweek, August 1970. (The first article, "The Fog," is a record of the actual experiences of the people in small town, Donora, Pennsylvania, overcome by a temperature inversion in 1948. The second reading, "Here Comes the Smog," deals with air pollution incidents around the world in 1970.) Discuss the articles, then ask the students to consider ways to make other people more aware of and concerned with the dangers of air pollution. Suggest that they re-enact or simulate the incident at Donora in a present-day local context through the production of a videotape. If the school does not have access to television equipment, the "incident" might be portrayed through a play or related presentation.

4 At this time, evaluate all completed contract units and return to the students. Display samples of their work (posters, collages, etc.) in the classroom.

RELATED ACTIVITIES:

- Have the activities of these past 6 weeks made you more aware of air pollution problems? More concerned? How?

- What can the individual citizen do to help stop air pollution?

- Is air pollution a matter of choice, or is it unavoidable? Explain.

- Why do people live and work in an area prone to air pollution problems?

- Is air pollution really a serious threat to man and society today, or is it merely a scare tactic proposed by ecologists in order to attack big business and industry? Explain.

- List and discuss the legislative accomplishments of our state and Federal governments in the area of air pollution control.

- Simulate another environmental crisis or disaster brought on by man's exploitation or man's manipulation of nature.

RESOURCE MATERIALS:

Air Is for Breathing. 29 min. color. Shell Film Library, 1433 Sadlier Circle, West Drive, Indianapolis, Indiana 46239.

Air Pollution. 2 filmstrips, 2 records, or cassettes, guide, script. Warren Schloat Productions, Pleasantville, New York.

Environmental Pollution: Our World in Crisis. 6 filmstrips, guide. Ward's Natural Science Establishment, Rochester, New York.

"Here Comes the Smog," Newsweek, August 10, 1970.

Roueche, Berton. "The Fog," The New Yorker, September 30, 1950.

CHEMISTRY

Energy by Fission

SYLLABUS REFERENCE: Chemistry; *Unit 2 - Atomic Structure*, C. Structure of Atoms, pp. 9-11.

ENVIRONMENTAL REFERENCE: Energy: Power generation

OBJECTIVES:

- To understand that resource depletion can be slowed by the development of substitutes for existing resources, prevalent lifestyles, and current priorities
- To investigate the possibility of producing energy by fission

PROCEDURES:

1 Direct a group of interested students to determine the number of kilocalories of energy produced by the neutron-induced fission of one kilogram of $^{235}_{92}U$. Supply them with the information given below, and request that they explain their calculations to the class when the activity is completed. Upon completion, discuss the activity with the class.

The nuclear equation for the neutron-induced fission of $^{235}_{92}U$ is

$$^{235}_{92}U + ^{1}_{0}n \longrightarrow ^{141}_{56}Ba + ^{92}_{36}Kr + 3\ ^{1}_{0}n + 4.61 \times 10^{9}\ \frac{kcal}{mole}.$$

This reaction releases about 200 million electron volts per atom (fission).

1 electron volt = 1.60×10^{-19} joules.

1 joule = 2.39×10^{-4} kcal.

Convert 200 million electron volts to kilocalories.

$$2.0 \times 10^{8} \frac{\cancel{\text{ev}}}{\text{atom}} \times 1.60 \times 10^{-19} \frac{\cancel{\text{joule}}}{\cancel{\text{ev}}} \times 2.39 \times 10^{-4} \frac{\text{kcal}}{\cancel{\text{joule}}} = 7.65 \times 10^{-15} \frac{\text{kcal}}{\text{atom}}$$

6.02×10^{23} atoms = 1 mole = 235 grams of ${}^{235}_{92}\text{U}$.

$$7.65 \times 10^{-15} \frac{\text{kcal}}{\cancel{\text{atom}}} \times 6.02 \times 10^{23} \frac{\cancel{\text{atoms}}}{\text{mole}} = 4.61 \times 10^{9} \frac{\text{kcal}}{\text{mole}}$$

$$4.61 \times 10^{9} \frac{\text{kcal}}{\cancel{\text{mole}}} \times \frac{1 \cancel{\text{mole}}}{235 \text{ kg}} = 1.96 \times 10^{10} \frac{\text{kcal}}{\text{kg}}$$

2 Using the table below, ask a second group of interested students to determine how many kilograms of coal, gasoline, oil, and alcohol are needed to release the same amount of energy.

SOURCES OF ENERGY	
coal	$5.6 \frac{\text{kcal}}{\text{kg}}$
gasoline	$11.0 \frac{\text{kcal}}{\text{kg}}$
fuel oil	$10.6 \frac{\text{kcal}}{\text{kg}}$
alcohol	$5.5 \frac{\text{kcal}}{\text{kg}}$

- Which of the above four fuels produces energy in the most efficient manner? The least efficient manner? Explain.
- How does the energy-producing efficiency of each of the four fuels compare with that of the neutron-induced fission of ${}^{235}_{92}\text{U}$?
- What are the future prospects of producing large quantities of energy by fission? What are some of the obstacles that may impede progress to this end?
- Where should funds come from to accelerate research in this field? Justify your answer.
- What precautions must be taken to protect the environment?
- What are some of the advantages that may eventually accrue (environmentally) if technology is able to perfect the process?
- Describe some possible changes in lifestyles that may result. What factors may bring these about?

- What are some of the arguments advanced by critics of expanding the production of nuclear energy? Are they justified? Explain.

RESOURCE MATERIALS:

Citizens' Advisory Committee on Environmental Quality. Citizen Action Guide to Energy Conservation. Washington: Government Printing Office, 1973. 64 pp.

Frank, Helmut J., and Jean E. Weber, Energy Consumption by States. Tucson: University of Arizona, 1973.

Hammond, Allen, et al. Energy and the Future. Washington: American Association for the Advancement of Science, 1973.

MAN HAS EXERCISED A PRESUMED RIGHT TO EXPLOIT THE ENVIRONMENT
HY ROSEN

"I CAN'T BELIEVE I POLLUTED THE WHOLE THING...!"

environmental education curriculum infusion units

social studies

for grades 7-12

Early Human Settlements and the Environment

SYLLABUS REFERENCES: Social Studies, Grade 7: Our Cultural Heritage; *Topic 1, The Pre-Columbian Period*, pp. 5-10; *Topic 3, The Colonial Period in the Americas*, pp. 17-22; *Topic 6, New York in the Gilded Age*.

ENVIRONMENTAL REFERENCE: Natural Environments: Habitats

OBJECTIVES:

- To study early human societies to determine if they were compatible with, or detrimental to, the environment
- To note ways in which improved technology tended to result in increased population and detrimental impact on the environment
- To identify lifestyles which exhibit varying degrees of impact on the environment

PROCEDURES:

1 Identify Native American tribes and locate them on a map of the local area and/or on maps of New York State and the United States. Ask students to study one of the Indian tribes thus identified and to prepare a report for presentation to the class. Develop the report on the basis of the following questions:

- What standard of living did the tribe have?
- How could the lifestyle of its members be described?
- How compatible was their lifestyle with the environment?

2 Distribute and review copies of a graph of population growth from pre-history through the early 19th century.

3 Show a filmstrip which reviews the Industrial Revolution in Europe. Discuss the following questions:

- What was its impact on living standards, employment, unemployment, population, and immigration?
- How was the influence of the Industrial Revolution manifested in America?
- Can all of the unrest which prompted emigration be attributed to economic conditions? Explain.

4 Have three groups of class members share an assignment for developing a chart showing comparative basic human needs, lifestyles, standards of living, and the environmental impact of all of these for three periods in history:

- Pre-Columbian

- Colonial (pre-Industrial Revolution) America

- The "gilded age"

Instruct the class to complete an additional chart segment labeled America in the '70's.

5 Using the developmental model that the completed chart represents, discuss the possible characteristics of life in the United States in the year 2075. Ask students to express their ideas in short stories, poems, essays, and/or drawings. Consider the following points.

- Standard of living

- Size and location of large urban areas

- Typical family vacation

- The state of agriculture; recreation; health

THE MOON IS A NICE PLACE TO VISIT BUT I WOULDN'T WANT TO LIVE HERE...

RESOURCE MATERIALS:

Overton, Jacqueline, Ed. Indian Life on Long Island. Port Washington, New York: Kennikat Press Corp., 1963.

Washburn, Wilcomb. Indian and the White Man. Garden City, New York: Doubleday.

SOCIAL STUDIES (7)

Native Americans and the Environment

SYLLABUS REFERENCES: Social Studies, Grade 7: Our Cultural Heritage; *Topic 1, The Pre-Columbian Period*, pp. 5-10; Teaching a Pre-Columbian Culture: The Iroquois; a guide unit for 7th grade Social Studies.

ENVIRONMENTAL REFERENCE: Economic/Social/Cultural Environments: Lifestyle

OBJECTIVES:

- To contrast the use of the environment by the pre-Columbian Native American with modern Western societies
- To compare the attitudes of the Native American toward the environment with those of modern Western societies
- To discuss the main points of the lesson about living harmoniously within the environment which modern societies might learn from pre-Columbian Native American culture

PROCEDURES:

1 Prior to this instructional activity, the students should have completed a contrast study of the cultures of the pre-Columbian Native American (with particular attention being given to the culture of the Southwest Native Americans) and modern Western societies. This content might be reviewed through the use of a teacher-prepared chart emphasizing the following:

- How time is measured and organized
- How space is measured and organized
- Roles of men and women
- Family relationships
- Communication
- Ways of explaining the unknown
- Ways of coping with the physical environment
- Ways of transmitting the culture
- Concept of the origin of the universe and humans' position in it; religious beliefs

Distribute copies of the "Philosophy of the Southwestern Indian" (see p. 128) for reading and discussion. The teacher may find it necessary to explain some of the vocabulary words in this selection. Ask the students to consider these questions:

- Do you agree or disagree with this philosophy? Explain.
- Can you detect the differences between the Native American's and modern society's "views" of the environment? What are they?
- What can you learn from the Native American regarding the environment? Discuss.

2 In order that students will understand this philosophy and answer fully the related questions, organize them into small groups and assign questions pertaining to the environmental philosophies operating within the Native American and Western cultures. Provide the class with reference books, pamphlets, articles, and visuals to support their research. For this activity, consider the philosophies of both the New York Iroquois and Southwest Native Americans.

- Where was man's place in nature, with respect to the roles of men and women, in the Native American culture? Consider the same question from the viewpoint of a Western European of the fifteenth century or earlier. Was this viewpoint any different for American settlers in the sixteenth and seventeenth centuries? Where is man's place in nature in today's modern culture?

- Compare the Native American's explanations of the unknown with modern society's tendency to use science and technology to explore and use nature. Did Western society in the fifteenth century apply a more sophisticated reasoning to an explanation of the unknown? Explain. How did each culture (Native American, pre-Columbian Europe, and modern society) view and use its natural resources? What were the health and disease problems of each?

- Which culture was most successful in dealing with the environment? Why?

- How do the Native American and Western cultures compare with regard to their views of the origin of the earth (and universe) and society's position in the environment? Specifically, contrast the creation account, a set of Native American (Iroquoian) beliefs, with the belief supported by Western societies in Genesis 1:20-28, "...shall have dominion over the fish of the sea and over the birds of the air and over everything that moves upon the earth."?

- People of both cultures had to cope with the physical environment to survive. Compare their attitudes toward and use of air, water, wildlife, plants, and trees as resources for the necessities of life. Specifically, compare their concern for and use of the bison and the beaver.

3 Reread the "Philosophy of the Southwestern Indian" to the students. Ask students to discuss, or express in writing, their thoughts concerning these final questions.

- What might Western societies have learned from the Native American of pre-Columbian times about the environment? Did explorers, frontiersmen, and settlers benefit in this way from their contacts with the peoples they encountered in the New World?

- Are Native American attitudes toward, and uses of, the environment different today? Explain.

- If the Native American's philosophy regarding the environment had been adopted by immigrating Western people, how might the American free enterprise, capitalistic system have been different? Would scientific and technological achievements have occurred at the same rate? Would the political system be different? Would women's rights and minority group struggles have been superfluous? Explain.

Philosophy of the Southwestern Indian

> "The most striking difference between the philosophies of the Southwestern Indian and Western man is the manner in which each views his role in the universe. The prevailing non-Indian view is that man is superior to all other forms of life and that the universe is to be used as he sees fit. The value placed on every other form is determined only by its usefulness to man, an attitude justified as 'the mastery of nature for the benefit of man.'
>
> "The Indian view is that man is part of a delicately balanced universe in which all components - all life forms and natural elements - interrelate and interact, with no part being more or less important than another. Further, it is believed that only man can upset this balance.
>
> "It is a tragedy indeed that Western man in his headlong quest for Holy Progress could not have paused long enough to learn this basic truth - one which he is now being forced to recognize, much to his surprise and dismay. Ever anxious to teach 'backward' people, he has been ever reluctant to learn from them."*

RELATED ACTIVITIES:

- Discuss the question, "Was the price of progress, the destruction of the environment for industrial, scientific, and technological development, necessary?"
- Cite ways in which the pre-Columbian Native American may have had a negative effect on the environment.
- Identify and discuss other "foreign" cultures in the world today which embrace the environmental philosophy of the Native American.

RESOURCE MATERIALS:

Bahti, Tom. Southwestern Ceremonials. Las Vegas: K. C. Publication, 1970.

Hertzberg, Hazel W. The Great Tree and The Long-House. New York: Macmillan, 1966.

Home. 29 min. color. Radio and Television Committee of the Southern Baptist Convention, 511 River Street, Missoula, Montana 54801.

Schwartz, J.M., and M. Goldberg. The Eastern Woodland Indians, Book 1. Phoenix, New York: Phoenix Press, 1961.

(A Select Bibliography may be obtained from the Department's Native American Education Unit.)

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*from Bahti, Tom; Southwestern Indian Ceremonials

SOCIAL STUDIES (7)

Air Pollution

SYLLABUS REFERENCE: Social Studies, Grade 7: Our Cultural Heritage; *Topic 7, New York in a Megalopolis Society*, pp. 46-53; *Topic 8, Local and State Government and Civic Responsibility*, pp. 54-65.

ENVIRONMENTAL REFERENCE: Pollution: Air

OBJECTIVES:

- To develop an understanding of the major sources of air pollution and recognition of the major pollutants
- To determine the air pollution level (classification) for the local community
- To examine major state and Federal air pollution standards governing industry as evidence of governmental responsibility
- To note the positive steps taken by local industries to maintain or achieve these standards

PROCEDURES:

1 Elicit from students a listing of the six major air contaminants. (Provide each student with a copy of "Air Contaminants" and "The Sources of Air Pollution" from pages 6, 7, and 8 of IT STACKS UP, New York State Department of Environmental Conservation.) If appropriate, enlist the assistance of a science teacher to explain the contaminants to the students.

  - What other sources of air pollution are there in addition to industrial?
  - Which contaminants come from each source? Prepare a chart showing contaminants and sources.

2 Provide students with the "New York State Air Classifications" map, also from IT STACKS UP, New York State Department of Environmental Conservation, page 26.

  - In which region (I, II, III, IV) is your community located?
  - What is the air classification level for your local area?

3 Invite a representative from your Regional Office of the Department of Environmental Conservation to explain the standard set for the major contaminants: sulfur dioxide, particulates, carbon monoxide, photochemical oxidants, hydrocarbons, and nitrogen oxides. Ask the representative to discuss the background and purpose of the 1970 Clean Air Act. (See pages 25, 16, and 17 of "Summary of Ambient Air Standards - Federal and State," IT STACKS UP.)

- What agency established the 1970 Clean Air Act?

- What are ambient air standards?

- What role did the 1970 Clean Air Act play in setting ambient air standards?

4 Conduct an action program by organizing students into groups of three.

- Ask them to use their knowledge of air pollutants and sources to make a list of the types of industries located in their community which might be responsible for the air classification level of their area. A bus excursion field trip would be an effective way to survey industries in the community.

- Have each committee prepare questions to be used in interviewing a spokesman from a local industry. The questions should be phrased as technically as possible with regard to ambient air standards, and should be designed to elicit the positive steps taken by the company to meet these standards.

- Prepare a composite set of questions from those submitted by all groups.

- Invite a representative from three local industries to meet with students and react to the prepared questions.

- Construct a chart, similar to that which follows, to organize and clarify the data obtained from the interviews.

Sample Air Quality Survey Summary

Contaminant	General Source	Air Standard	Positive Step Taken By Industry

5 After the interviews with industrial representatives, discuss the following:

- What progress has been made by these industries since 1970 in meeting the ambient air standards?

- How do the three industries studied compare with each other in their efforts to meet ambient air standards?

- How can citizens report air-polluting incidents to the authorities? Who are the proper authorities? Why should citizens do this?

RELATED ACTIVITIES:

- Prepare a survey on the main points of the Federal Clean Air Act of 1970 to ascertain the awareness of the general public of these regulations.
- Plan a field trip to a local industry to observe air pollution emission control devices in action.
- Prepare a contrasting list of the positive and negative references made by the news media concerning industry and air pollution during a week's time.
- Conduct research to determine when the ambient air standards might be met in the local community.
- Construct a poster depicting the struggle to maintain the air standards in the local region.
- Plan a school awareness assembly on air pollution. Include a panel discussion on the positive steps taken by local industries to control air pollution.
- Prepare a brief handout for students, faculty, and parents listing ways in which private citizens can reduce air pollution.
- Explain how governmental action with regard to air pollution standards is an example of the exercise of governmental responsibility.
- How may citizens demonstrate civic responsibility in relation to air pollution problems?
- How are these problems changing city life? Can the trend be reversed? If so, how?

RESOURCE MATERIALS:

Environmental Repair Kit. Talcott Mountain Science Center, Montevideo Road, Avon, Connecticut 06001.

Feder, Bernard. A Matter of Life and Breath. New York: American Book Co., 1973.

Harris, Jacqueline, Ed. Our Polluted World. Middleton, Connecticut: American Education Publications Unit Book, 1968.

It Stacks Up! New York State Department of Environmental Conservation; Division of Educational Services.

Needham, Dorothy. Pollution: A Handbook for Teachers. New York: Scholastic Services, 1970.

Simplified Guide to New York State Air Pollution Control Rules and Regulations. New York State Department of Environmental Conservation; Division of Air Resources. 1974.

SOCIAL STUDIES (7)

The Psychology of Graffiti

SYLLABUS REFERENCE: Social Studies, Grade 7: Our Cultural Heritage; *Topic 7 - New York in a Megalopolis Society,* pp. 48-49.

ENVIRONMENTAL REFERENCE: Economic/Social/Cultural Environments: Aesthetics

OBJECTIVES:

- To determine why people write graffiti
- To highlight the problem in the school (if it exists) and attempt to eliminate it or channel it into socially acceptable endeavors

PROCEDURES:

1 Take the class on a tour of the halls and/or other areas of the school where graffiti exist.

- Where are they found? Where are they not found? Have pupils speculate as to the reasons for its existence in some places and absence in others.
- Is the problem widespread? Is there evidence of custodial attempts to remove graffiti? Why, or why not?

2 Discuss: "Is graffiti artistic or tasteless?"

- Is graffiti interesting and pleasant to view? Why, or why not?
- Should the writing of graffiti be legalized? Explain.
- Should special areas be set aside for writing graffiti? Defend your point of view.
- Do any of the pupils in the class write graffiti? (This question can be answered anonymously, if necessary.) If they do, why do they?
- Why do pupils think others write graffiti?

3 Set up two committees to conduct research on graffiti.

Committee #1: To study the history of graffiti

- How old are graffiti? What are their origins?
- When did they become an urban problem?

- What laws exist relating to graffiti?
- Are these laws enforced? If not, why not?
- What attempts have been made to understand the reasons for graffiti and to try to combat the underlying problems which prompt people to write them?

Committee #2: To record different types of graffiti on slides which can be projected and then analyzed by the class

- What are the kinds of graffiti found in the school and its neighborhood? Can they be categorized? If so, what are the categories?
- Are different types found in different parts of the neighborhood? If so, how can you explain this?
- If some students do not live in the school neighborhood, how do the graffiti in their areas compare with those around the school?
- Is there any way to account for the different types of graffiti? If so, explain.
- What universal characteristics, if any, do graffiti have?

4 Give students a homework assignment to draw their own graffiti on blank transparencies. Project the transparencies and elicit class discussion.

- What is each drawing trying to say?
- Is the interpretation what the creator intended? If interpretations differ, how is this explained?
- Is there any similarity among the drawings of members of the class? Discuss.
- Does drawing graffiti on a designated area give the artist as much satisfaction as when he uses a prohibited area? Explain.

5 Develop and test hypotheses about why people draw graffiti.

- Introduce and define the term "hypothesis." Have pupils practice writing hypotheses on any subject. Give a homework assignment to write several hypotheses dealing with the reasons people write graffiti. Have pupils evaluate each other's hypotheses.

  -Are they realistic?
  -Can they be tested?
  -Are they worth testing?

- Discuss polling as a way of testing these hypotheses.

  -What questions should be asked?
  -Who should be polled?

-How can the pollster overcome the problem of reluctance to answer a question truthfully?

- What other methods can be used to test hypotheses?

6 Conduct a survey about graffiti.

- Prepare a questionnaire based on the hypotheses the class considered best. Plan survey procedures.

  -What does "sampling" mean?
  -From what population should the sample be selected? Why?
  -How large should the sample be?
  -What is the best procedure for selecting the sample?
  -How should the questionnaire be distributed?

- Conduct a survey of the population selected by the class, using duplicated questionnaires. Arrange for all necessary logistical details, such as permission to conduct the survey, opportunities for the class to see other students, etc. Tally the results and analyze the statistics. Prepare charts and graphs of the findings. Upon completion of the survey, discuss the following:

  -Were any of the hypotheses correct? If so, which ones?
  -Which findings of the survey coincide with predictions the class may have made? Which did not?
  -Did the class feel that the responses on the questionnaires were honest? What led them to that feeling?
  -What were the reactions of those in the sample to the survey in general? To the questionnaire in particular?
  -What did the class learn about the causes of graffiti as a result of the survey?

7 Have the class assemble a report presenting their conclusions regarding the motivations of graffiti writers, incorporating their research, historical and statistical, and their photographic evidence.

8 Make a bulletin board displaying a summary of the research and evidence for all to see, especially those who were part of the sample or who wrote graffiti.

9 Conduct a class discussion on whether or not graffiti could be made socially acceptable, and if so, how.

RELATED ACTIVITIES:

- Have the class write and perform a drama for performance at an assembly showing the results of the survey (i.e., types of people who write graffiti and reasons for doing it). Include at the end of the play ideas for using the "art" in acceptable ways.

- Involve the class in the following evaluative questions:

- Do more people in the school speak about graffiti now than before the survey? Explain.
- Have any other classes or clubs become involved in trying to decrease the amount of graffiti in the school? Which ones? Why?
- Has there been a decrease in the amount of graffiti in the school? Give evidence.
- Did the class find the unit an instructive one? Why, or why not?
- Is an educational or punitive approach the best to take when attempting to eliminate aesthetically unacceptable graffiti? Give reasons.

RESOURCE MATERIALS:

Mailer, Norman. "The Faith of Graffiti," Esquire Magazine, May 1974, p. 77.

Mailer, Norman. The Faith of Graffiti. New York: Praeger, 1974.

SOCIAL STUDIES (7-8)

An Environmental Bill of Rights

SYLLABUS REFERENCES: Social Studies, Grade 7: Our Cultural Heritage; *Topic 8, Local and State Government and Civic Responsibility,* pp. 54-65. Social Studies, Grade 8: Our Cultural Heritage; *Topic 8, The Federal Government and Civic Responsibility,* pp. 127-132.

ENVIRONMENTAL REFERENCE: Economic/Social/Cultural Environments: Civic responsibility

OBJECTIVES:

- To distinguish between a right and a responsibility
- To gain more insight into the workings of a democracy
- To devise an "Environmental Bill of Rights" (an "environmental ethic")

PROCEDURES:

1 Discuss the following with students:

- What is a right?
- What is a responsibility?
- What is the "Bill of Rights?"

2 Direct students to read carefully the first ten amendments to the Federal Constitution. Discuss with the class the long and difficult task of writing these statements.

3 Provide students with a handout listing a number of environmental responsibilities.

- Why should all individuals be responsible for the environment?
- Do all individuals also have rights regarding the quality of their environment? Explain.

4 Ask students to write a list of rights pertaining to the quality of our environment. Copy these on the chalkboard or an overhead projector transparency and have students analyze and discuss in relation to the following:

- The Constitution guarantees to each individual "life, liberty, and the pursuit of happiness." What does "life" mean in this statement? How does this relate to environmental problems?
- Categorize each statement as a right or a responsibility.
- How do the concepts of right and responsibility overlap in dealing with the environment? Do they correspond? Explain.
- Is each statement reasonable both as a private right and as a right of an organization or corporation? Why, or why not?
- Why is it difficult to be specific in dealing with individual rights?
- Do any of the statements suggest infringement on the right(s) of other individuals in any way? Which ones, and how do they?
- Why is there a need for individual concern and action with regard to environmental improvement?

Vote to retain or eliminate each statement of "environmental rights."

5 Provide the students with a typed, revised list of their "environmental bill of rights," and review the difficulties encountered in the democratic procedure employed in preparing the list. A sample environmental bill of rights follows.

Environmental Bill of Rights

Every individual shall have the inalienable right to:

-breathe clean, unpolluted air
-drink clean, unpolluted water
-receive an ample amount of food
-have adequate sources of energy for life

-have access to natural land areas
-maintain wildlife in their natural areas
-live on an adequate piece of land
-express concern regarding an environmental problem

RELATED ACTIVITIES:

- Survey a number of the students in the school. Will they "accept" your environmental bill of rights? Why, or why not?

- Prepare posters and/or cartoons depicting environmental rights and responsibilities for display in the school.

RESOURCE MATERIALS:

The Environment - Challenge of the 70's. 6 tapes, guide. Washington Tapes, 5540 Connecticut Avenue, N.W., Washington, D.C. 20015.

Environmental Crises: What the Individual Can Do. filmstrip, record, guide, script. National Education Association, 1201 16th Street, N.W., Washington, D.C. 20036.

The Planet Management Game. Houghton-Mifflin, 110 Tremont Street, Boston, Massachusetts 02107.

The Seventies: Decade for Decisions. filmstrip, record, guide. New York Times, Book and Educational Division, 229 West 43rd Street, New York, New York 10031.

SOCIAL STUDIES (8)

Environmental Impact of Westward Expansion (1800-1825)

SYLLABUS REFERENCE: *Social Studies, Grade 8: United States History; Topic 8, The National-Republican Period*, pp. 77-101, (1st. understanding on p. 80).

ENVIRONMENTAL REFERENCE: Natural Environments: Communities/ ecosystems

OBJECTIVES:

- To study the relationship between people and their environments in American history

- To use the examples to identify the people's roles as users and abusers of the environment

- To relate these examples to the development of an understanding of current environmental problems

- To enable students to use this knowledge to develop possible solutions to current environmental problems

PROCEDURES:

1 Direct students to read the portions of their textbooks which deal with the topic and have them identify the people's relationship with the environment as follows:

- As users of land
- As users of transportation
- As users of power (energy)
- As makers and laborers
- As consumers and users of services

2 Have students form committees, each with a chairperson and a recorder, for each of the roles described above. The committee should determine the limits of investigation of the role and identify potential resources for gathering information. Each committee will then engage in its investigation with the objective of producing a report which contrasts the impact in the identified role in the early 19th century with information about how people use land, energy, etc., in the 1970's.

Comparisons will most likely emerge along the following lines:

- People use land more intensively today.
- There are more "efficient" modes of transportation today, but each has its own attendant problems.
- Present rates in increase of energy consumption require planning and cooperation considerations unheard of when compared with a time when it appeared that energy resources were virtually limitless.
- Production methods have changed, but not all necessarily for the better.

3 The class should list local environmental problems and match them with the people-centered approach in procedure 2, using the following:

- Interviews with local government officials; a labor leader, a land developer, etc.
- Visits to a local power plant, a factory, and the highway department
- Surveys of family and friends on environmental problems
- Researching current local news media

Then, instruct students to develop a chart comparing the environmental problems and solutions of the first quarter of the 19th century with today's problems and possible solutions.

4 Have students project 50-100 years into the future and predict what the environmental problems might be then as compared with those of today.

RELATED ACTIVITIES:

- Consider doing the same activity with the latter three-quarters of the 19th century, using the following generalizations/understandings. Page numbers are taken from the Syllabus Reference cited at the beginning of the unit.

  -During the period 1825-1840, the abundance of western land served both as a contribution to the rising tide of democracy and as a source of friction among various economic groups (page 84).
  -During the 1825-1840's, political diversity was closely tied to sectional interests (page 84).
  -In the 1825-1850 era, the Homespun Age culture moved west (page 87).
  -In the four decades of the struggle of division and reunion, 1850-1880, the face of the nation reflected its ever-expanding economy (page 90).
  -In the post-Civil War era, the frontier continued to attract settlers, but to a life quite different from that of earlier frontiers (page 101).

RESOURCE MATERIALS:

Frontiers, Democracy, Industry. (filmstrip) Society For Visual Education.

SOCIAL STUDIES (8)

Parks and Open Space

SYLLABUS REFERENCE: Social Studies, Grade 8: United States History; *Topic 8, ... Civic Responsibility*, pp. 127-132.

ENVIRONMENTAL REFERENCE: Land Use: Planning; Recreation

OBJECTIVES:

- To study land use in the neighborhood of the school
- To research the community's need for parks and recreation areas
- To develop a proposal for the use of undeveloped parkland which would meet the diverse needs of a community

PROCEDURES:

The nature of the unit necessitates a long time span, but not a continuous concentration on this one topic. The on-going unit can be punctuated by "change-of-pace" lessons related to other topics in the curriculum.

1 Discuss the needs of the community.

- What kind of housing is available?
- What stores and services are nearby?
- What recreational facilities are available?
- Are there open spaces? Where are they? How are they used?

2 Take students on a walking tour of the neighborhood. Focus their attention on parcels of undeveloped parkland.

- How much of the neighborhood is commercial? Industrial? Residential?
- What types of residences are there (single-family; two-family; garden apartments; high-rise; other multiple dwelling; special use (e.g., senior citizen residences)?
- Where is the parkland in relation to the commercial section? residential section? industrial section?
- Where are there other open spaces in addition to the parkland?

3 Take students on a walking tour of the undeveloped parkland.

- What kind of terrain is it?
- What is the general condition of this parkland?
- Is the park used at all? If so, how? If not, why not?
- How can the natural layout be preserved and used to best advantage?
- Develop a land use map of the area.

4 Have students develop a list of facilities they would like to see in the park.

- Are all of the facilities on this list needed? Is there a difference about both what is on the list and what is needed?
- For whom were the facilities on the list planned? Did students make provisions in their plans for all of these groups of people?

- Has student input ever been sought by the community or public agencies in deciding what facilities should be constructed in the park? If so, explain. If not, why haven't students been able to make their opinions heard?

- What factors other than need have to be considered in deciding what facilities should be constructed in a park? Did students take these points into consideration in preparing their lists?

5 Set up committees to conduct research related to the parcel of undeveloped parkland.

Committee #1: To collect information about the history of this parcel of parkland

- What is the natural history of this land? Was it ever forested? If so, why were the trees cut down? Was it ever wetland? If it was filled in, when was it? How? Why?

- How long has it been parkland?

- How and why was it acquired? Why has it never been developed?

Committee #2: To learn community opinion concerning the parkland

- What does a class survey show about the possible uses the community suggests for the land?

- Is there unanimity of opinion in the community about these uses? If not, what groups espouse what ideas?

- Have any community organizations conducted meetings to discuss the parkland? If so, what were the outcomes of these meetings?

Committee #3: To understand what processes are involved in developing a city park

- What are the present plans for this parcel or parkland?

- Who formulated these plans and how was it done? Do you agree with this process?

- What provisions does the city make for citizen participation in the decisionmaking process?

- What would be the advantages of developing this parkland? What would be the disadvantages?

Committee #4: To find out how park development is financed

- Who initiates funding for the development of parks?

- Who decides whether these funds will be allocated?

- What percentage of the municipal budget is used for parks? Do you feel this is an equitable percentage? Why, or why not?

- How are parks ranked on a priority listing of city needs and expenditures? Do you agree with this priority ranking?

6 Invite a community official such as a planning board member or parks official to visit the class and discuss the possibilities of developing the park and the role his agency would play in that development.

7 Revise the original list of students' proposals for parkland development, if necessary.

- Based on their committee research, how well do their plans meet the needs of the community? Discuss.

- Are all of their proposals financially sound in the light of budgetary realities? If not, where should their proposals be placed on the list of priorities?

- Are some of the facilities suggested by the students already available in sufficient quantity elsewhere in the community so that duplication will be avoided? What groups would be served by these facilities?

8 Duplicate a topographical map of the area on a spirit master. On the map, have students indicate the facilities they would include in the park and where these facilities should be located.

9 Invite a landscape architect (or art teacher) to discuss methods of making landscape models of students' plans. Consider all variations of terrain.

10 Have the class make a model of the park showing the terrain. This can be done with layers of cardboard from shirt laundry or packing boxes, or papier-mâché. Have students use this base to make a model of the new park they have designed, changing the terrain only where necessary to improve the area.

11 Display the three-dimensional model in the school library for the rest of the school to see. Elicit feedback from other students, faculty members, and parents.

Present the model to the community planning board for consideration when final decisions about the park's development are made.

RELATED ACTIVITIES:

- Make a documentary showing the planning process the class followed.

- Ask students to compare their ideas about parks and park use before and after the unit.

- Prepare a written examination to test students' understanding of the processes and agencies involved in community planning.

- Invite a long-time resident of the area to reminisce with the class about the neighborhood and about the changes that have taken place.

  -How did the neighborhood look during his youth?
  -How did the parcel of parkland look then? How was it used?
  -What is his opinion about future development of this parkland?
  -How has the role of local government in matters of this nature changed?

RESOURCE MATERIALS:

McQuade, Walter, Ed. Cities Fit to Live In. New York: Macmillan, 1971.

Munzer, Martha E. Planning Our Town. New York: A.A. Knopf, 1964.

Munzer, Martha E., and Helen W. Vogel. Block by Block. New York: A.A. Knopf, 1973.

Munzer, Martha E., and John Vogel, Jr. New Towns. New York: A.A. Knopf, 1974.

SOCIAL STUDIES (8)

An Evaluation of the Neighborhood Environment

SYLLABUS REFERENCE: Social Studies, Grade 8: United States History; *Topic 8, ... Civic Responsibility*, pp. 127-132.

ENVIRONMENTAL REFERENCE: Land Use: Planning; Construction

OBJECTIVES:

- To discover examples of good and poor planning in the neighborhood

- To compare and contrast well-maintained and poorly-maintained houses and their surroundings

- To speculate on ways poor planning and poorly-maintained homesites can be improved

PROCEDURES:

1 This project is designed for pupils with limited reading ability, but can be adapted for all ability levels. It is intended for small committees of pupils interested in the topic and in the use of photography as a reporting media.

This mini-project can be used an an introduction to a larger unit on neighborhood, block, or town planning. Consider the following understandings:

> "Expansion of the metropolitan area has created serious problems."
>
> -deterioration in the central city: physical decay and mounting problems
> -antiquated planning
>
> "Urban planning is basic to the future of the metropolitan region."
>
> "Metropolitan areas have similar basic problems."
>
> -meaningful use of space
> -adequate and decent housing

Discuss the present condition of the neighborhood.

- What factors or conditions could be used to define well-maintained properties?

- Are there any instances of poorly-kept buildings? Of poorly-kept grounds around homes and apartment buidlings? Give examples.

- Are there any instances of particuarly well-kept buildings and well-cared-for properties? Give examples.

2 Form a committee of two or three pupils to investigate and photograph well-maintained and/or well-planned and poorly-maintained and/or poorly-planned properties in the neighborhood surrounding the school. (Committee members should own or have access to the photographic equipment needed for the project. One camera/photographer is sufficient for each committee.)

3 Form a committee of two or three pupils who live in a neighborhood away from the school to investigate and photograph well-maintained and/or well-planned and poorly-maintained and/or poorly-planned properties within their own neighborhood. (These committees may be formed along geographical lines. The members of each committee would live in the same neighborhood.)

4 Before the committees go out to take pictures, take them on a walking tour of the school's neighborhood.

- Which areas are well planned? Which properties are poorly planned? Which properties are well maintained? Which are poorly maintained?

- How would you go about photographing these properties to illustrate their condition?

5 Once the committees have completed their photographic investigations, evaluate and edit the results.

- In what order should the slides be projected to best express the committee's point of view about what is good and bad in the planning and care of the neighborhood investigated?
- Do the slides actually depict well-planned, poorly-planned, well-maintained, or poorly-maintained properties? Explain.
- How could the poorly-planned areas have been improved in their original planning? How could they be improved now?
- What might explain why properties in the same neighborhood are so markedly different in planning and maintenance?
- What tactful ways could be found to persuade property owners to provide better maintenance for their property?

RELATED ACTIVITIES:

- Plan a class symposium on the topic, "Our neighborhood should have a master plan."
- Have students plan and conduct a clean-up project for poorly-maintained, publicly-owned property in the neighborhood.
- Have students conduct research to determine which public agencies should be contacted about poorly-maintained, publicly-owned property in the neighborhood. Write letters to these authorities registering complaints about the condition of these properties.

RESOURCE MATERIALS:

Mead, S. "Planned Neighborhoods." Better Homes and Gardens, November 1974, pp. 74-70.

Michelsohn, David R. Housing in Tomorrow's World. New York: Messner, 1973.

"More Help for Housing, More Money for Cities," U.S. News and World Report, August 26, 1974, p. 70.

"Moving into a Good New Development: Chicago Suburb," Better Homes and Gardens, March 1975, pp. 44-45.

Munzer, Martha E. Planning Our Town. New York: A.A. Knopf, 1964.

"New Communities Shape Orderly Growth," American City, May 1974, p. 92.

Safdie, M. "Beyond the City Limits; Housing and Communities of the Future," Saturday Review World, August 24, 1974, pp. 54-57.

World Population Growth vs. Rate of Food Production

SYLLABUS REFERENCE: Social Studies, Grade 9: Asian and African Culture Studies.

ENVIRONMENTAL REFERENCE: Population: Growth Rate; Distribution and density

OBJECTIVES:

- To define a food calorie
- To compare our daily caloric intake with that of other areas of the world
- To identify areas of the world whose populations suffer from calorie deficiency
- To understand and apply the Malthusian Theory of population growth and food production
- To become aware of the alternatives to present land use and food consumption

PROCEDURES:

1 Explain to the students what a food calorie is and how and why it is measured.

2 Devise a calorie counter worksheet for each student, such as the sample on page 144. Have the students record their caloric intake over a period of two or three days. Determine the average intake for the class.

3 Have students devise a key, using the information below and then research caloric intake for world regions, with the information being placed on an outline map such as the example on p. 145.

- Starvation - less than 1500 calories/person/day
- Potential starvation - 1500 to 1900 calories/person/day
- Adequate - 1900 to 2300 calories/person/day
- More than adequate - 2300 or more calories/person/day

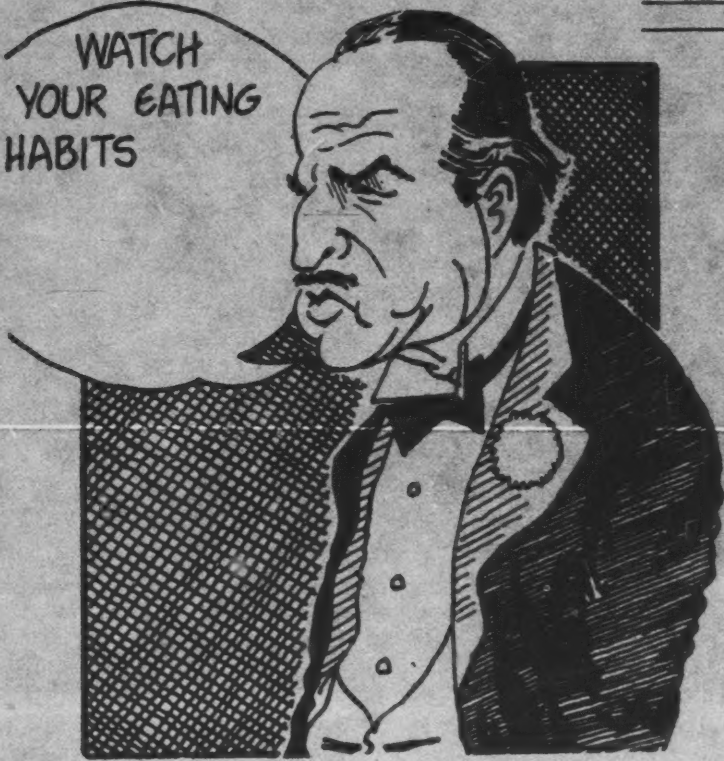
4 Once students have completed the map, devise a worksheet designed to determine where and to what degree the world suffers from famine (p. 146).

5 After students have completed their calorie intake chart and the calorie level map of the world, have them compare their level with that of some area of the world.

the CALORIE COUNTER

	AMOUNT	AVERAGE CALORIES
American cheese	$1\frac{1}{2}$ oz.	110
Angel cake	2 oz.	150
Apple	1 med.	80
Apple juice	$\frac{1}{2}$ c.	60
Applesauce	$\frac{1}{2}$ c.	115
Apricots		
Asparagus		
Bacon, crisp		
Baked beans		
Banana		
Bean sprouts		
Beans, green		
Beef, lean		
Beef potpie		
Beef steak		
Beets		
Biscuits		

	AMOUNT	AVERAGE CALORIES
Blackberries		
Blueberries		
Bologna		
Boston cream pie		
Bran flakes, 40%		
Bread		
Broccoli, fresh		
Broth, beef		
Brownie		
Butter		
Buttermilk		
Cabbage		
Cake, plain		
frosted		
Canadian bacon		
Candy, hard		
Cantaloupe		

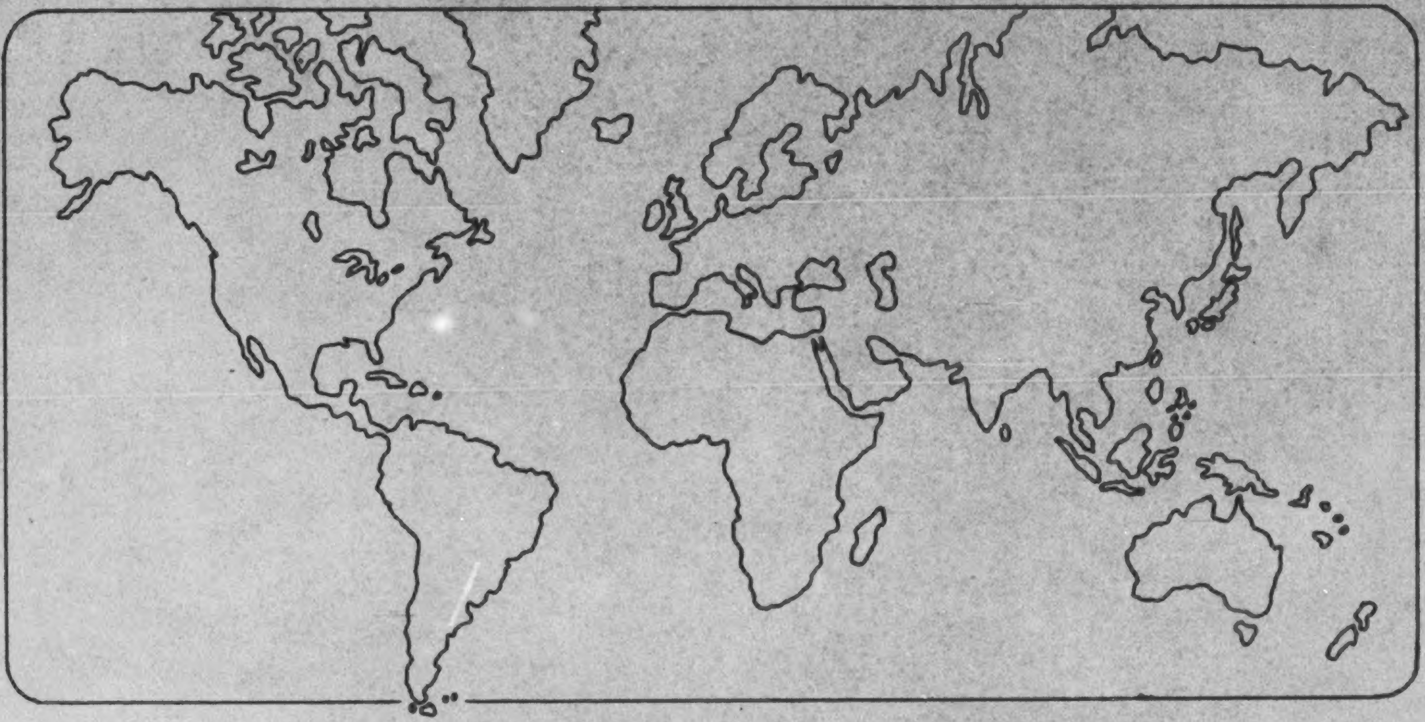


FEAST OR FAMINE

A SPECIAL WORLD FOOD MAP

by ______________________

☐ STARVATION
☐ POTENTIAL STARVATION
☐ BELOW ADEQUATE CALORIE INTAKE
☐ ABOVE ADEQUATE CALORIE INTAKE



THE FOOD CRISIS!

USING YOUR WORLD FOOD MAP, A WORLD ALMANAC, AND A POLITICAL MAP OF THE WORLD, ANSWER THE FOLLOWING QUESTIONS.

1. Which area of the world is experiencing the most extensive starvation problems?
2. In which area of the world is starvation affecting the most people?
3. The hunger problem, although not confined to one hemisphere, seems to be more severe in which hemisphere?
4. Those areas experiencing famine seem centered in which latitudes?
5. Name one continent which seems to have more than adequate calorie intake.
6. Name one continent where famine seems to exist.
7. Which of the starvation level areas is affected by its overwhelming population?
8. Which of the potential starvation level areas is affected by its overwhelming population?
9. Which of the continents besieged by famine is experiencing these problems because a climatic type seems to be moving further south?
10. What is that climatic type mentioned above?
11. Are the areas blessed by "feast" the grain eaters or protein eaters of the world?
12. Are these same "feast" areas the developed or undeveloped areas of the world?
13. Which continent seems to have the most serious food problem?
14. Which country suffers most from floods and typhoons that lay waste to its foodstuffs?
15. In which category from your "food map" do most of the tropical countries lie?

6 Introduce the students to the Malthusian Theory and predictions of the impending crisis of Population-Food Production. Emphasize the close relationship between population growth and food production. Determine how we can increase food production and make people aware of the needs of these famine areas of the world.

7. Check the method and type of advancement of agriculture in some of the countries mentioned on the worksheet that are experiencing famine (India, Niger, Brazil, Southwest Africa, etc.). Look at their geography and climate and the reasons for their poor diets.

8. Give possible alternatives to present agricultural methods, land use, and cultural dietary habits in the starving countries. Make students aware of the cost in time, money, and human effort needed to alleviate this crucial problem.

9. Have students watch closely their eating habits and note those frills with which they indulge themselves. Make a list of eating habits and foods that could be eliminated.

10. Have the students write an essay answering the following question: Why do (or why don't) the nations indulging in the feast have an obligation to regularly supply the famine-beset nations of the world?

RELATED ACTIVITIES:

- Write to the World Food Council and request information about present efforts and programs for food-short nations.

- Write to the Department of Agriculture to determine what it is doing to alleviate the world food problem.

- Write to your Congressman and Senator to discover if they support, or might sponsor, any national food policy which would send surplus food overseas.

- Write and request information from the United Nations about the present world food situation and how you, your class, your school, your family or your community might be of assistance.

- Sponsor a food drive and collect non-perishable foods that might be distributed through a church organization or mission to needy communities in the world. (There is a possibility that this project might lead to some type of "sister-city" relationship).

RESOURCE MATERIALS:

Callahan, Dorothy, and Alma Smith Payne. The Great Nutrition Puzzle. New York: Charles Scribner and Sons, 1956.

"Feast for the Vulture," Time, November 8, 1974, pp. 40-41.

Lowenberg, Marion E. Food and Man. New York: John Wiley and Sons, 1974.

"Running Out of Food," Newsweek, November 11, 1974, pp. 56-68.

"World Food Crisis," Time, November 11, 1974, pp. 66-83.

SOCIAL STUDIES (9)

Inefficient Use of Resources

SYLLABUS REFERENCE: Social Studies, Grade 9: Asian and African Culture Studies; *Topic 1, World Cultures Today*, (2nd understanding on p. 6).

ENVIRONMENTAL REFERENCE: Economic/Social/Cultural Environments: Lifestyle

OBJECTIVES:

- To understand that cultures with high technological development use a disproportionate amount of the world's natural resources
- To recognize the unconscionable waste that occurs in natural resource use
- To recognize that the United States is the world's largest consumer of natural resources

PROCEDURES:

1 As an ongoing activity with this unit, as students read and study about the Afro-Asian cultures, have them compare the following with the United States.

- Types of consumer goods
- Availability of consumer goods
- Technological development

Once the comparison is complete, discuss the following.

- Which nation produces more? How do you explain this?
- Which nations consume the greatest portion of the world's resources?
- What is the relationship between what a country produces and what it consumes?
- In what way does the gluttonous appetite of some nations affect other nations of the world?

2 Direct students to compile a list of commonly used household appliances and consumable and nonconsumable items. After the students' lists are complete, ask them to categorize each as essential or non-essential to the daily life of their households.

3 Once the individual lists have been categorized, ask students to solicit the help of the other members of the family in curtailing or completely eliminating the use of the nonessential items for one week. At the end of the week, discuss the results, answering the following questions.

- How was the lifestyle of your household affected by this experiment?
- What resources were conserved and/or upgraded by this experiment?
- If this new lifestyle became prevalent, how would it affect our economy?
- In light of the answers to the previous question, would it be worth the effort? Explain why or why not.
- Who should control the use of consumable items? Give reasons why.

4 Begin a class and school-wide campaign to curtail use of items that unnecessarily consume valuable resources. Give all those who voluntarily exhibit their compliance a pin or plaque signifying that they have done their share. Entitle the campaign WOW (Wipe Out Waste). Use the art work and certificate facsimile which follow as aids in your campaign.

JOIN THE CAMPAIGN AND WIPE OUT WASTE!
WOW

WIPE OUT WASTE

WOW

This Certifies That

Thomas J. Maloney

Has earned special recognition and is hereby granted this Certificate of Award for

Wiping out Waste

In Witness Whereof our signatures are hereto affixed.

Given this 1st *day of* September *nineteen hundred and* 75

Herbert Bothamley
Principal

Barry W. Jamason
WOW Coordinator

RELATED ACTIVITIES:

- Procedure #3 might be adapted to become an activity for the entire student body.

RESOURCE MATERIALS:

"Don't Make These Spending Mistakes", Changing Times, April 1972, p. 30.

Furness, B. "Can You Get Reliable Buying Advice?" McCall's, July 1972, p. 16.

"Help for Consumers; Government Agencies," Today's Health, April 1974, pp. 64-65.

Janssen, P. "Educating for the Market Place," Scholastic Teacher Jr./Sr. High, February 1972, pp. 10-12.

SOCIAL STUDIES (9)

The Power of Petroleum

SYLLABUS REFERENCE: Social Studies, Grade 9: Asian and African Culture Studies; *Topic 1, World Cultures Today*, pp. 4-13. (2nd understanding on p. 6 and the understanding on p. 12.)

ENVIRONMENTAL REFERENCE: Energy: Fuel supplies

OBJECTIVES:

- To understand the power the oil-producing nations of the world have recently gained
- To define the terms "haves" and "have nots"
- To determine the possible alternative sources of energy

PROCEDURES:

1 Discuss with the class the formation of the oil cartel by the oil-producing nations. (See "Countering the Oil Cartel," Time, November 11, 1974, p. 36.)

- What effect does this cartel have on the price of crude oil?
- Why are the Arab nations sometimes referred to as "have nots?"
- What are some of the differences between "have" and "have not" nations?

- How might the oil cartel help to change Arab nations from "have nots" to "haves?"

2 Give students copies of the cartoon on p. 153; ask them to examine it closely, then fill in the blanks below.

- The puppets represent ________, ________, and _________.
- The nationality of the puppeteer is ___________.
- The "show" is being performed in the ___________.
- Those in the audience are ___________.
- The sign names ___________ as the puppeteer.

Check the true statements below.

- ______ The puppets' actions are operated by the puppeteer.
- ______ The audience thinks this is a funny show.
- ______ The puppet operator is pleased with his show.

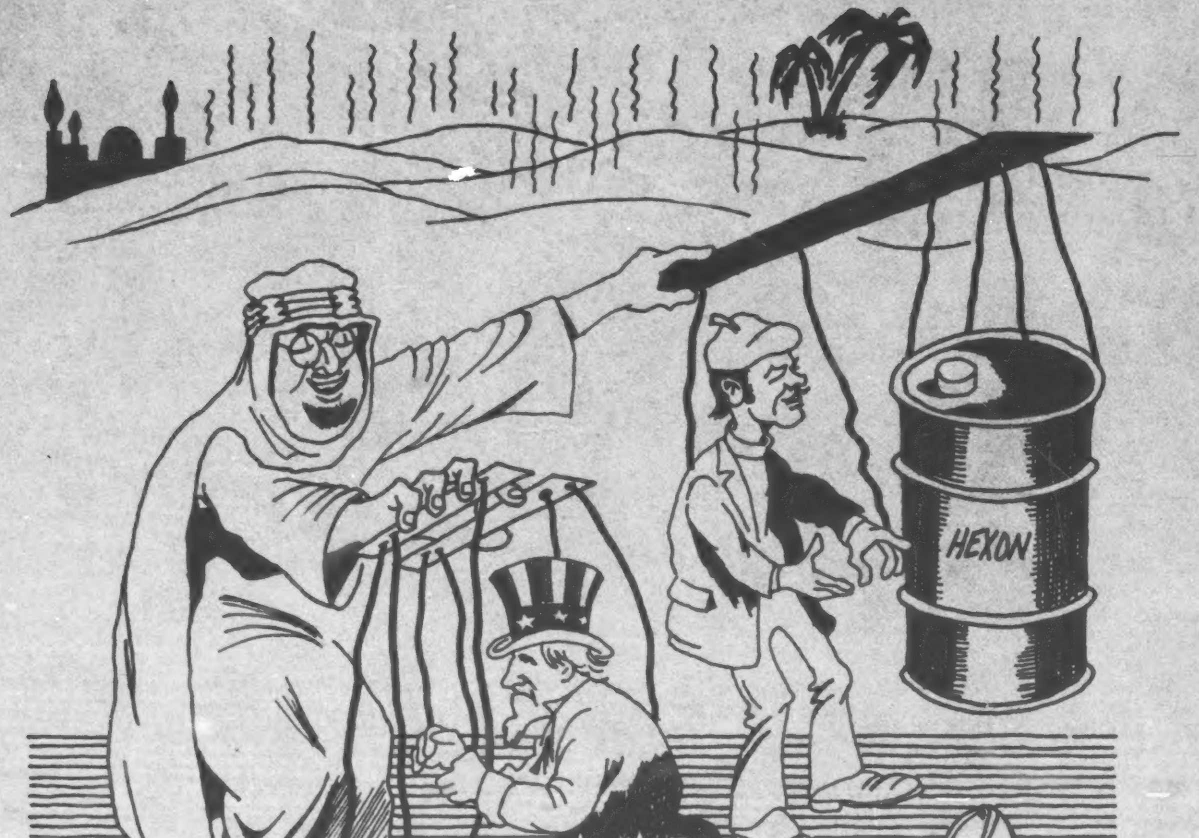
3 Explain the message of this cartoon. These questions might best be used for class discussion.

- Would the cartoon mean the same thing if the puppets were not in their costumes? Why, or why not?
- How or why is this puppeteer able to manipulate his "dolls" or "dummies"? How did he acquire this new "talent" or "skill"?
- What is the puppeteer trying to show his audience?
- How is the cartoon symbolic of what has really happened to the political and economic relationship among the countries depicted?

4 Ask students to work individually or in small groups on one of the following projects.

- Write a script for a one-act puppet show based on the cartoon. Try acting it out.
- Draw a cartoon that follows this same theme.
- Explain how the puppets might feel, and project what they might do to find relief.

5 Conclude the unit by focusing on possible alternative energy sources as a solution to the immediate threat of the oil cartel and the long-range problem of energy scarcity.


HEXON
NOW PLAYING
FAISAL'S WESTERN PUPPET PERFORMANCE

RESOURCE MATERIALS:

American Gas Association. New Sources of Gas... Where and When? Arlington, Va., 1973.

"Countering the Oil Cartel," Time, November 25, 1974, p. 36.

"Faisal and Oil," Time, November 6, 1975, pp. 8-32.

Hammond, Allen, et al. Energy and the Future. Washington: American Association For The Advancement of Science, 1973.

Holdgren, John, and Philip Herrera. Energy: A Crisis in Power. San Francisco: Sierra Club, 1971.

Hunter, Robert E. The Energy "Crisis" and U.S. Foreign Policy. New York: Foreign Policy Association, 1973.

Mancke, Richard B. "Blackmail by Oil," The New Republic, October 1973, pp. 8-9.

Perus, Bruce, "Those Ingenious Exotic Fuels," The Sciences, June 1973, pp. 6-11.

SOCIAL STUDIES (9)

India

SYLLABUS REFERENCE: Social Studies, Grade 9: Asian and African Culture Studies; *Topic 4, South Asia (India and Pakistan)*, pp. 31-44.

ENVIRONMENTAL REFERENCE: Economic/Social/Cultural Environments: Poverty

OBJECTIVES:

- To understand why India is considered a "have-not" nation
- To identify those resources India has in adequate supply
- To identify those factors which have hindered India's economic progress
- To predict and categorize India's priorities for achievement

PROCEDURES:

1 Distribute to each student a copy of the cartoon on page 156 and allow time for studying it. Then proceed with the questions following the cartoon.

- What is the man on the ladder trying to reach? (bag of gold)
- Why is he unable to reach it? (too high - on top of wall)
- What asset does he have which will help him overcome these obstacles? (the ladder)
- Why isn't the ladder a real asset? (Because it has broken rungs. Although he has the tool with which he could reach his goal, it is inadequate and he must improve it.)
- Where was the ladder made and how is this significant? (England - The British gave India the potential for self-subsistence but never developed it.)
- On the right side of the ladder list India's assets. The list has been begun for you.
- On the left side of the ladder list the liabilities that India must overcome. The list has been begun for you.
- On your cartoon, number the liabilities in the order in which you think India ought to attack them. Discuss the order.
- On your cartoon, number the assets in the order of their importance, the greatest being number one. Discuss the order.
- What caption might we give this cartoon?
- On the back of the cartoon, explain why you chose this caption.

RELATED ACTIVITIES:

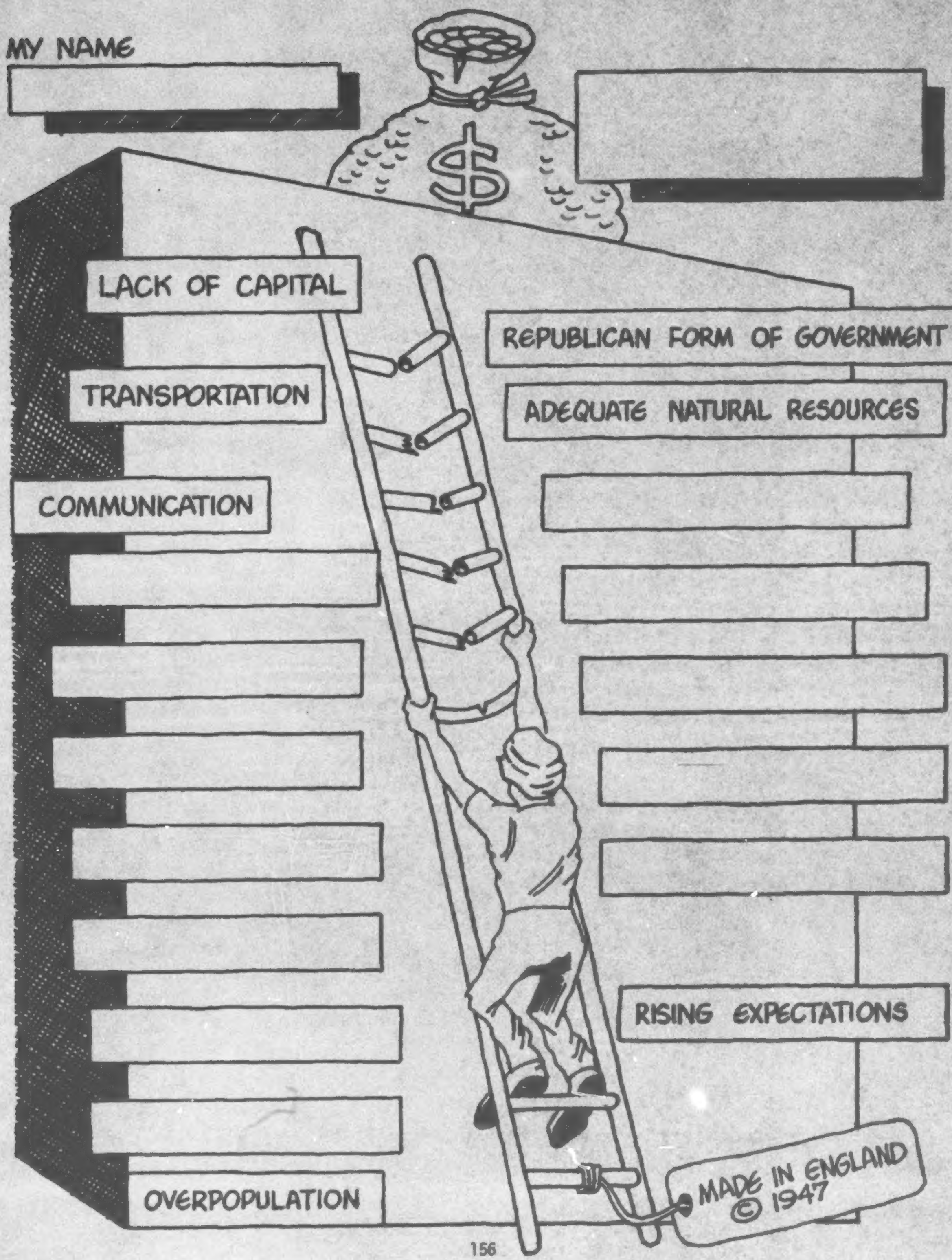
- Have a student report to class on India's Five Year Plan.
- Have students produce a resource map of India.
- Have students write an essay explaining how the solution of one of India's economic problems might affect any of her other problems.
- Determine what India's average annual rate of population growth has been during the past decade. Relate this information to India's economic and social problems.
- Consider the feasibility of "rising expectations" in Asian nations in terms of the population base and resource consumption.

RESOURCE MATERIALS:

"Enlightened Self-Interest," Forbes, June 1, 1974, pp. 20-21.

Franda, M.F. "India in Crisis," Current, May 1975, pp. 36-49.

Mehta, V. "Letter from New Delhi," New Yorker, October 14, 1974, pp. 147-161.


MY NAME
LACK OF CAPITAL
REPUBLICAN FORM OF GOVERNMENT
TRANSPORTATION
ADEQUATE NATURAL RESOURCES
COMMUNICATION
RISING EXPECTATIONS
OVERPOPULATION
MADE IN ENGLAND
© 1947

SOCIAL STUDIES (9)

Endangered Species

SYLLABUS REFERENCE: Social Studies, Grade 9: Asian and African Culture Studies; *Topic 2, Africa South of the Sahara: Land and People* (1st understanding on p. 15 and the understanding on p. 18); *Topic 3, Africa South of the Sahara: Historic Trends* (1st understanding on p. 21).

ENVIRONMENTAL REFERENCE: Natural Environments: Endangered species

OBJECTIVES:

- To discover what animal species are endangered
- To study the relationship of these animals to humans
- To develop an awareness of the interdependence of humans and animals in the ecosystem

PROCEDURES:

1 Animals affect the environment in many ways. Some of the ways we understand from past experience and research. Some of the ways are not entirely known. The problem is that many of our animals are facing extinction and that their extinction may adversely affect us. It is important to study individual species on the endangered list to better understand our relationship with them. Many scientists view animals and humans as inextricably linked in a complex ecological relationship. If that relationship is disturbed by removing one species from it, the unforeseen consequences may be serious. Right now, the precise effect of any particular extinction is impossible to forecast. "We do not know enough about the part each animal plays," explains Hong Kong conservationist Michael Webster. "Only after the mammals are gone will we be able to find out the vital link they filled, and then it will probably be too late." ("Wildlife in Danger," Newsweek, January 6, 1975, page 38.)

Introduce the problem by quoting from any articles on the dangers to wildlife. The article,"Wildlife in Danger," referred to above is excellent.

- What are some examples of animals whose position in an ecological cycle have been proven (hippopotami, sparrows, alligators, large cats)?
- What are some of the major reasons animals are endangered (hunting, legal and illegal; man's need for new land; pesticides; zoos; pet trade; scientific research)?

- Consider to what extent some of these practices are avoidable or may be modified.

- Why should all species of animals be preserved? (Animals are a source of knowledge in terms of their experience in coping with their environment; animals may hold the key to man's understanding of his own ecological position; aesthetics; to prevent the disruption of systems.)

- How may animals be protected?

2 Distribute a list of endangered species. (See illustration, page 159.) Ask each student to select a species and prepare a report based upon the following outline.

- Species and phylum of each animal
- Physical characteristics
- Description of habitat
- Description of behavior
- Relationship to other animals
- Relationship to humans
- Reasons why the animal is endangered
- Drawing of the animal (if possible)

Encourage students to find a variety of interesting formats and media for their reports. (Use drawings, 3-D models, audio-visual aids, etc.)

Students should develop a glossary of terms, such as those below, while preparing their reports.

- Phylum
- Predator
- Omnivorous
- Carnivorous
- Herbivorous
- Gestation
- Habitat
- Ecosystem
- Environment
- Life cycle
- Longevity
- Ecological cycle

3 Discuss the ways in which wildlife is endangered or protected in your local community.

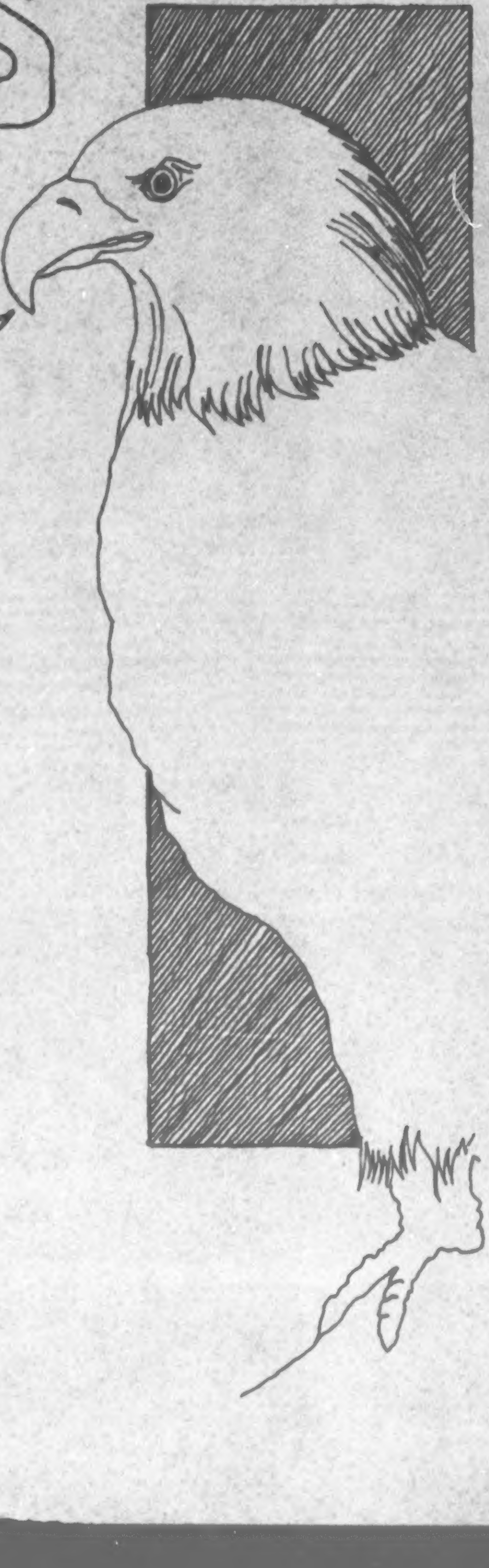
- What are the local laws regulating which animals may be hunted and when?

- Are there areas where hunting is banned? Where? Why?

- What is posted land? Why might land be posted?

- How has the encroachment of cities on suburbs, and of suburbs on rural areas affected wildlife?

ENDANGERED SPECIES


AM I ON BORROWED TIME?

Endangered Species

Timber Wolf
Blue Whale
Brow-Antlered Deer
Maned Sloth
Bighorn Sheep
Ostrich
Lynx
Condor
Cheetah
Pére David's Deer
Crested Ibis
Monkey-eating Eagle
Southern Bald Eagle
Laptev Walrus
Eskimo Curlew
Whooping Crane
Ivory-billed Woodpecker
Polar Bear
European Bison
Marsupial Mouse
Orangutan
Manatee
Mauritius Kestrel
Saddle-backed Tortoise
Rhea
Eagle Hawk

Bactrian Camel
Black-footed Ferret
Leopard
Lion
Elephant
Seal
Rhinoceros
Tiger
Vicuna
Mountain Gorilla
Red Wolf
Mexican Grizzly
Arabian Oryx
Aye-Aye
Prezewalski's Horse
Giant Panda
Tasmanian Wolf
Numbat
Tapir
Nutria
Marsh Deer
Ocelot
Jaguar
Armadillo
Crocodile
Alligators

RELATED ACTIVITIES:

- A whole project could be developed around the idea that humans and other animals all need certain things in common to survive and balance their environment.

  -How does availability of water affect animals? Humans?
  -What is territoriality? How does it relate to humans and animals?

- What happens when there are too many animals or too many people?

- What are some of the results of congestion? Animal death? Crime and social disorder?

- Notice that the battle lines have already been drawn between some state agencies and the environmental protection groups.

  -What are some of these confrontations?
  -Why is it necessary to strengthen environmental agencies?

- If there are any endangered species in the area, have students write a petition to distribute in the community. Send these petitions to local elected officials as an indication of the community's concern.

- What are zoos doing about endangered species? If possible, arrange a visit to the zoo to gain information about endangered species.

RESOURCE MATERIALS:

Enduring Wilderness. 16 min. Color. Syracuse University Film Library, 1455 East Colvin Street, Syracuse, N.Y. 13210.

Fisher, James. *Wildlife in Danger*. New York: Viking Press. 1969.

One Day at Teton Marsh. 48 min. Color. Syracuse University Film Library, 1455 East Colvin Street, Syracuse, N.Y. 13210.

"Wildlife in Danger," *Newsweek*, January 6, 1975, pp. 36-41.

SOCIAL STUDIES (9)

Priorities for Developing Nations

SYLLABUS REFERENCE: *Social Studies, Grade 9: Asian and African Culture Studies; Topic 4, South Asia (India and Pakistan)*, pp. 31-44.

ENVIRONMENTAL REFERENCE: Economic/Social/Cultural/Environments: Lifestyle

OBJECTIVES:

- To recognize that economic, social, and cultural environments are directly affected by how a government prioritizes its monies
- To recognize what the cost of war does to a nation's economy

PROCEDURES:

1 One of man's greatest resources is money; it frequently determines how other resources are used. How a nation, a developing one in particular, spends its monetary resources can determine if and how it solves its environmental problems. Unfortunately, many of the developing nations are not responsive to the needs of their citizens and the resultant difficulties are seemingly insurmountable. It is essential that money be used to benefit society. Too frequently, unwise economic decisions are made by a few, and these decisions create environmental disaster for many.

Using the material below, or material similar to it, prepare a tape for student listening on how India, a developing nation, utilizes its resources.

India's environmental crisis has become glaringly evident because of some recent natural catastrophes. The monsoons shifted and left some areas, traditionally farming areas, with little or no water. In other areas the rainfall was heavy enough to flood the countryside. Millions were without food. They swarmed to the cities and are now dying in the streets; they fight over small morsels of food and have rioted, looting stores. Government troops shot some down in the streets. As a result, the government is spending much-needed money reserves to purchase food abroad.

In the past decade, India was forced into a conflict with China. She also engaged in two major skirmishes with Pakistan. More recently, like many developing countries, she was squeezed by the exorbitant rise in oil prices which have made her not-too-distant neighbors on the Persian Gulf wealthy. At the same time, she is trying to become a nuclear power at great cost to her economy, and she is pushing dangerously close to bankruptcy.

On top of this, thirteen million new faces appear every year, creating a continuous and perpetual "baby boom." India's farmers fall further behind in the "people vs. food" problem. Her farmers are poor and their land is owned by rich men called Zamaindars.

All this has led to political unrest, and the Communists become stronger daily, pointing to the success of their Chinese neighbors.

After students have listened to the tape, direct them to consider the following. Some research may be necessary.

- More precisely identify India's problems and their relationship to one another.
- Make suggestions Indira Gandhi should follow in dealing with India's problems. Examples, with suggested responses, follow.

Indira Gandhi's government should:

resolve the land problem by

-confiscating property and compensating the land owners
-seizing land outright and redistributing it
-reclaiming wastelands
-subsidizing crops
-other

solve the population problem by

-letting nature take its course; the weak will starve and the strong survive
-spending more money on birth control techniques
-opening abortion clinics
-taxing child-bearers
-other

solve the food problem by

-relating it to the population control solution
-purchasing from abroad
-increasing the use of fertilizer
-building massive irrigation projects
-other

solve the problem of technology and nuclear power by

-scrapping the project altogether as too expensive
-developing only peaceful uses of energy
-using the "bomb" to get economic concessions from other nations, particularly the "oil sheiks"
-subsidizing research by taxing the people
-other

solve the oil crisis by

-converting industry to the use of abundant coal reserves
-threatening war
-asking for assistance from the U.S. and the U.S.S.R., perhaps through the U.N.
-rationing the use of petroleum
-other

- Consider what might happen if she took your advice.

- Determine how to create an interest and awareness among others of the seriousness of our world environmental problems.

2 Devise a checklist similar to the one below (or use this sample) to elicit student opinions about governmental spending.

Check those services you feel government should provide for its citizens.

- Provide police and fire protection.
- Insure an adequate water supply.
- Build parking ramps for downtown shoppers.
- Keep the city clean.
- Subsidize the local philharmonic orchestra.
- Maintain an amusement park.
- Establish day care centers for working mothers.
- Dredge a marina for private boats.
- Create jobs for unemployed workers.
- Build apartments for elderly citizens.
- Give free medical treatment to the indigent.
- Control rats.
- Operate a zoo.
- Support a home for unwed mothers.
- Determine the amount of money to be spent on education.
- Enact legislation to build, stock, and staff public libraries.
- Appoint committees to oversee public expenditures and to insure integrity in government.
- Condemn and raze buildings.
- Control licensing of animals.
- Build bicycle trails.
- Provide movie theaters.

Once students have made their choices, discuss each service with them, concentrating on those which evoke disagreement. Demand supportive facts to back opinions wherever possible.

3 Form a committee of students to obtain information on how the local government budgets its monies and how much of the total is committed for environmental use. Discuss the priorities reflected in the budget. Additional committees may be formed to gather the same kind of information about the state and national budgets.

4 Direct students to read each of the paragraphs below and identify the country described. Then conduct a discussion on the prioritizing of each country's money.

- It has over thirty million people living in proximity to the Nile River. She depends on the Aswan Dam for irrigation. Her main export is cotton, money from the sale of which is used to purchase military equipment from the Soviet Union. She recently signed an agreement to buy over $300 million worth of wheat from the United States. Her people are extremely poor and have notoriously poor health. She is ever ready for a war with Israel,

  This country's name is ______________________. (Egypt)

- Some of its citizens claim job discrimination. They have resorted to urban guerilla war against the British and the Protestants. They spend their time bombing stores, public buildings, and places of work, and assassinating soldiers and civilians alike. Conditions are now truly deplorable.

  This country's name is ______________________. (Northern Ireland)

- Its army fought Biafra to keep the nation "one." It practiced genocide on the Ibo tribe, whose "Christian" contribution to the stability of a Muslim state is world-renowned. The Ibos had many of the important jobs in government because of their high degree of education. This is another country victimized by the drought in West Africa.

  This country's name is ______________________. (Nigeria)

- This country spends over 80 billion dollars on defense. It has modern nuclear weapons. It is determined to protect itself from its enemies (real or imagined) while its cities fall into decay and its less able citizens are faced with "economic disaster."

  This country's name is ______________________. (United States)

- This state in the desert spent four billion dollars on national defense in 1974 alone. The average citizen earned $90 a week and spent 50% of that on food. That figure has risen to 60% in 1975, principally because the currency has been devalued to pay the massive defense expenditure. This means it will spend 20 times more for military equipment than for food. Many of its farmers leave the kibbutz to serve in the army.

  This country's name is ______________________. (Israel)

5 Discuss with the class the economics of war, emphasizing what it does to the environment and projecting what could be done to improve the environment if the money spent on war were allocated in that direction.

RELATED ACTIVITIES:

- Form a committee to visit the school library and find information on the National Defense Budget and the budget for the Department of Housing and Urban Development. Discuss the priorities in light of urban decay in the U.S.

- Read about Israel's wars with the Arabs. Discuss the relationship between these wars and the high cost of living.

- Research the reasons for conflict in Northern Ireland.

- What is the per capita income of Egypt? What are the figures for trade between Egypt and the U.S.S.R.? Is there any relationship between these figures and the per capita income? Explain.

- Read and discuss articles on Nigeria, the Biafran War, and the economic aspects of the conflict.

RESOURCE MATERIALS:

Brown, N.L., and E.R. Pariser. "Food Science in Developing Countries," Science, May 9, 1975, pp. 589-93.

"Budget Cuts and Distorted Priorities," Christian Century, December 18, 1974, p. 1187.

Myrdal, K.G. "Transfer of Technology to Underdeveloped Countries," Scientific American, September 1974, pp. 172-178.

"$100 Billion Guessing Game," Time, April 7, 1975, pp. 59-60.

"Winners and Losers," Newsweek, September 30, 1974, pp. 74-75.

SOCIAL STUDIES (11)

Citizen Involvement in Land Use Planning

SYLLABUS REFERENCE: Social Studies, Grade 11, American History; *Topic II, Government and Politics*, pp. 11-17.

ENVIRONMENTAL REFERENCE: Land Use: Planning

OBJECTIVES:

- To identify local areas of historical and ecological significance

- To identify the individuals and private and governmental agencies whose responsibility it is to deal with land use questions

- To develop a real or imaginary park area
- To develop a land use plan based upon population projections

PROCEDURES:

1 List the factors that make our environment fit for us.

2 List the factors that have been modified by man to make the environment more comfortable.

3 List changes made by man in the environment that have backfired; where what was intended to be an improvement had unexpected detrimental consequences, and/or those changes in which the cumulative effects have been different from their separate, initial effects.

4 List local land use problems and rank them in order of importance. Students with similar interests should group into committees to outline plans for attacking the problem and to list specific questions to be asked of agencies concerned with the particular problem.

5 Each committee should consider the following activities when attacking its problem: library research; area map search; tours and hikes; identification of sites and problem areas; and consultations with governmental agencies, action groups, and individuals knowledgeable about their defined land use problem. Three to five days may be spent on this activity. Index cards summarizing the day's activity should be handed in daily.

Committee #1: Architecture

Meet with a member of the local historical society to gain information about the following:

- The aesthetic value of architectural variety
- Space and architectural efficiency
- The names of the local, county, state, and Federal agencies concerned with historical buildings and sites
- The best method(s) of presenting information to the general public about the value of preserving historic areas (35 mm slides, workshops, publications, etc.)
- The preservation of building materials and natural resources by reusing old buildings

Committee #2: Wetlands

- Arrange a meeting with the Conservation Advisory Council, local Environmental Conservation Department, Town Board, and/or other similar groups about the use, value, and plans for local wetland areas.

- Read appropriate articles and books concerning the nature and value of wetland areas for wildlife, purification of water, and interest to a particular industry.

- Write a report on the environmental interest in wetland areas. Include recent legislation; pictures, drawings, and maps of wetlands and surrounding areas; governmental agencies responsible for the wetland areas.

- Cite any landmark, wetlands court decisions.

Committee #3: Parks and Recreation

- Arrange a meeting with the governmental group concerned with the establishment of parks, nature trails, bike trails, and walking trails which may exist within your locale.

- Prepare a map to be used by persons interested in those activities, indicating present and proposed trails.

- If possible, plan a class hike along one of the trails.

- Prepare a pamphlet on how to develop a park for your locale (consider its uses, cost, size, and environmental impact).

Committee #4: Sewage Treatment

Contact the agency dealing with sewage treatment for your locale. Arrange a meeting with the treatment expert to obtain the following information:

- Area the plant serves

- Size and type of the plant

- Effect effluent water has on local water sources

- Cost of sewage treatment to local residents

- Date plant was constructed

- How revenues were raised for the construction of the plant

- The number of districts not served by the plant

- The future of the plant in the event the population increases

- The local, county, state, and Federal agencies that oversee the plant

- The problems of rural sewage and who legislates its control

After these and other questions which may have arisen have been answered, prepare an informational booklet to be distributed to class members and/or other interested groups in the school and the community.

Committee #5: Planning

- Arrange a meeting with local, county, and/or state agencies concerned with zoning, growth, and planning for your locale. Agencies such as the United States Census Bureau, the United States Department of Agriculture, the New York State Office of Planning Services, the County Agriculture Department, the County Office of Planning and Promotion, the Town Board, and the Town Planning Board should be helpful.

- Prepare a report concerned with the development of the local region until the year 2,000. Be sure to include:

  -population of the area
  -a map of proposed commercial, residential, and farm areas
  -proposed highways and transportation facilities
  -proposed schools, hospitals, and social service centers

Committee #6: Landfill and Solid Waste

- Arrange for a visit to the landfills within the locale. Contact the local Conservation Advisory Council to discuss the following:

  -number of legal landfill sites within the locale
  -availability of the landfill to non-town residents (individuals or sanitation companies)
  -average length of life of the landfill and the sites of future landfills
  -recycling at the site and/or composting

From the information received, prepare a map and informational pamphlet for distribution to interested groups.

- Sort and weigh the household refuse that is normally deposited in the landfill during a given length of time.

- Prepare a chart of the information and relate the type of material discarded (edible food, aluminum, ferrous metals, plastic, paper, cloth, glass, compost material) and the percentage by weight of each category.

- Contact recycling centers for information on the weight of materials recycled each week or month.

- Prepare a composite informational booklet on solid waste as it exists in your locale.

- Prepare a map or chart showing the number and location of junk cars in your area.

RESOURCE MATERIALS:

Davis, J.C. *Politics of Pollution*. Indianapolis, Ind.: Pegasus, 1970.

Foerster, Bernd. *Architecture Worth Saving in Rensselaer County*. Troy: Rensselaer Polytechnic Institute, 1965.

Insall, D.W. *The Care of Old Buildings Today*. London: Architectural Press, 1972.

Our Land: Its Uses and Values. 3 Filmstrips, 3 Records or Cassettes, Guide, Script. Warren Schloat Productions, Inc., Pleasantville, N.Y. 10570.

Ressner, Philip. *Park in the City*. New York: Dutton.

Witaker, Benjamin, and Kenneth Browne. *Parks for People*. New York: Schocken Books, Inc., 1973.

SOCIAL STUDIES (11)

Community Populations and the Environment

SYLLABUS REFERENCES: *Social Studies, Grade 11: American History*; *Topic II - Government and Politics, Citizen Relationship to Government*, pp. 15-17; *Social Studies, Grade 11: American History*; *Topic I - The American People, Population*, pp. 7-8.

ENVIRONMENTAL REFERENCES: Population: Distribution and density, Growth rate

OBJECTIVES:

- To develop within students an awareness of their immediate environment
- To create an awareness relating to the interrelationship of communities and their natural environments
- To assist students in developing problem-identification and problem-solving skills
- To recognize that community population trends have environmental and economic significance

- To determine how changes in the age distribution in a community create new demands on the government and on the environment.

PROCEDURES:

1 Group students within the class by the geographical area in which they live. Each group will canvass its neighborhood to determine the ages of the children and parents within the household and to list environmental problems that have developed within the community as it grew. Each student participating will be given instruction on how to develop a questionnaire and how to interview individuals. The teacher will also explain and illustrate to the students an age distribution chart and a population pyramid.

2 Send students into their respective neighborhoods to gather the necessary information and to chart their findings. Have each student make a brief analysis of his or her findings and then, with the entire class, make a comparison of the various findings.

3 Select some students to correlate all the data and make a presentation to the entire class. Present the findings of this student group or committee to the class and through class discussion determine what issues or problems could develop as a result of the population trend or patterns determined. Each student is then required to suggest a solution to a problem determined by the class. These problems and suggestions should be charted on the chalkboard or a ditto that can be reproduced for each student. A sample follows.

PROBLEM: Solid waste disposal

SOLUTION: Increase sanitation pick-ups.
Enforce litter regulations and create new ones, if necessary.

PROBLEM: Lack of recreational areas

SOLUTION: Each contractor is required to provide space for a recreational park before building application is approved. Town government should assist contractors in determining site and size of park.

PROBLEM: Increased traffic congestion

SOLUTION: Place traffic lights in areas determined to be potentially dangerous. Town government should place NO THROUGH TRAFFIC signs in areas which are used by motorists as "short-cuts" to avoid the mainstream of traffic.

PROBLEM: Vandalism - Public property, cemeteries, automobiles, fences, and other private property

SOLUTION: Increase police supervision and patrol. Additional recreational areas with organized activities to help eliminate this trend, should be provided, if idleness is a significant factor.

4 Arrange for groups of students to interview the following:

- The building principal on the subjects of past, present, and projected enrollment data; what effects changes in school population have on curriculum, pupil services, class size, quality of education, and cost of education within the district
- The head custodian on how changes in the school's population affect supply budgets, maintenance, and vandalism incidents
- Local businessmen to determine how their individual businesses and the economy of the area as a whole are affected by changes in the school population
- Citizens who live in the immediate neighborhood of the school to determine how changes in school population affect the quantity of noise created by students, buses, and autos; the amount of litter

Once the information is gathered by all the groups, each should report its findings to the class and a discussion should follow. From the discussions, students should be able to draw some conclusions about the relationship of population to the environment.

RELATED ACTIVITIES:

- Students may wish to follow through on their suggested solutions to determine cost. Have them:
  - -visit the neighborhood police station and interview people in authority to determine the cost of additional police or supervision
  - -interview the superintendent of highways to determine cost of traffic signs and a representative of the Department of Transportation to discuss the feasibility and cost of traffic lights
  - -interview a building contractor and members of the local planning board to determine the feasibility of mandatory park facilities
  - -interview local sanitation office or independent refuse companies to determine the feasibility and cost of additional pick-ups

- An ambitious class may wish to follow through on its suggestions and attempt to get municipal and county legislation passed to solve some of the problems.

RESOURCE MATERIALS:

The Challenge of Six Billion. 27 1/2 min. Color. Modern Talking Picture Service, 315 Springfield Avenue, Summit, New Jersey 07901.

The Ecological Crises. 6 Filmstrips, 3 Records or Cassettes, Guide. Q-ED Productions, 2921 West Alameda Avenue, Burbank, California 91505.

Population Ecology. 19 min. Color. Syracuse University Film Library, 1455 East Colvin Street, Syracuse, New York 13210.

Population Explosion. 48 min. BW. Syracuse University Film Library, 1455 East Colvin Street, Syracuse, New York 13210.

SOCIAL STUDIES (11)

Community Attitudes and the Environment

SYLLABUS REFERENCE: Social Studies, Grade 11: American History; *Topic II, Government and Politics, Citizen Relationship to Government*, pp. 15-17.

ENVIRONMENTAL REFERENCE: Economic/Social/Cultural Environments: Civic responsibility

OBJECTIVES:

- To determine the degree of community recognition of environmental problems
- To identify local environmental problems
- To define the level of responsibility (local, state, or Federal) of the identified environmental problems
- To determine the degree of community agreement on solutions to the problems
- To determine the role of the citizenry in solving environmental problems

PROCEDURES:

1 Divide the class into groups of two or three students to poll the community to determine its environmental concerns. Each group should be accompanied by an adult if the poll is taken door to door. Fewer

adults would be necessary if the poll were taken in a well-populated area such as a shopping center where the polling groups would be in proximity of each other. Each interviewer should note the sex, general age (teenager, middle-aged, senior citizen, etc.), and area of residence within the community of each interviewee. Try to interview 100 citizens in order to get an appreciable sample. Ask the following:

- What do you see as the most serious environmental problem in your community?
- What do you think is the solution to the problem?
- From what level of government should the solution come: local, state, or Federal?
- What do you see as the role of the ordinary citizen in this problem?

Upon completion of the poll, students should categorize responses to determine the major problems, their proposed solutions, and with whom the responsibility for these solutions lies. Once some definite conclusions about the community attitudes can be drawn, efforts should be made to bring them to the attention of the proper responsible local authorities and the following questions should be asked.

- Are the people and the local government sensitive to the same problems? Cite evidence.
- Are their proposed solutions similar? If not, why?
- What social, economic, and/or political consequences might the solution(s) have on the community?

2 Direct two students to write letters to the major public opinion analysts (Roper, Yankelovich, Gallup, and Harris organizations) for any information they may have gathered from recent polls relating to environmental problems. When the responses arrive the class can compare their survey results with national trends. Ask students to make some generalizations about the kinds of environmental problems that concern Americans across the land.

RESOURCE MATERIALS:

Citizens' Advisory Committee on Environmental Quality. Citizen Action Guide to Energy Conservation. Washington, D.C.: Government Printing Office, 1973.

Environmental Crises: What the Individual Can Do. Filmstrip, Record, Guide, Script. National Education Association, 1201 16th Street, N.W., Washington, D.C. 20036.

Population and Gross National Product

SYLLABUS REFERENCE: Social Studies, Grade 12: Advanced Economics; *Topic I, The Nature of Economic Understanding*, pp. 1-5; *Topic IV, Economic Growth and Stability*, p. 27; *Topic V, The United States Economy in the World*, p. 23.

ENVIRONMENTAL REFERENCE: Population: Growth rate

OBJECTIVES:

- To understand that the limited nature of productive resources make it imperative that a society define its economic objectives in terms of environmental reality
- To recognize that man must develop the technical and sociological knowledge needed to control population growth, modify environments, and alter resource use patterns
- To recognize that natural resources are unequally distributed with respect to land areas and political boundaries
- To recognize that trade will be mutually beneficial if trading partners specialize in those products in which they have the greatest productive efficiency

PROCEDURES:

1 Economic growth is undeniably a major objective of most countries in the world, including the United States. It can be described in terms of per capita output as a measure of production against population increase and inflation.

Through reading and research, direct the class to respond to the following. Discuss the responses.

- Define Gross National Product.
- Chart the change in GNP over the last decade.
- Determine the percentage of change for each year.
- The figures found for GNP may have been based upon "current" prices for each of the years used. If so, why is it then important to use figures reflecting "constant" dollars or prices in assessing economic change or growth?
- What has been the average rate of increase in real (using constant prices) gross national product during the decade?

- What is the approximate rate of change in real GNP which is anticipated for the current year?

- What are the advantages of controlling inflation?

- What is the significance of population as a factor in determining Gross National Product?

- What is the relationship of population size and growth to Gross National Product?

- What effect will the decline in the rate of population growth in the United States have upon (a) productivity, (b) inflation, and (c) per capita output?

- Is the present rate of population growth in the United States (0.62 percent per year as of 1972) a cause for optimism or pessimism in terms of the economy? In terms of the environment? In terms of social conditions?

- How does this rate of population growth compare with Western Europe's rate? Latin America's? Asia's? Africa's?

- What is the significance of these comparisons in terms of the United States' economic activity in the years ahead?

2 A basic element of the theory of international trade is the concept of *comparative advantage*. This idea holds that, in the words of the 19th century economist, David Ricardo, "...under a system of perfectly free commerce, each country naturally devotes its capital and labor to such employments as are most beneficial to each..." Simply stated in 20th century terms, comparative advantage refers to the special ability of a country to provide one product or service relatively more cheaply than other products or services.

Direct a committee of students to develop a list of products and services which are produced for export by several Western nations. For these products selected, have the students determine whether their production conforms to the definition above. Namely, is the country effectively exploiting its labor and capital in the production of these goods to the extent that it has a trade advantage or favorable balance of trade as a result? Explain.

Instruct a second committee to select several developing nations and list their exportable products and services. Elicit the same analysis of these products in terms of their economic importance in the international marketplace as was done with the Western nations.

Discuss the following with the class.

- If a nation's comparative advantage lies with the use of labor and capital in agriculture, mining, forestry, or shipping, should it plan to eventually industrialize its economy? If it did, would there be a period in which it would be at a decided disadvantage in marketing these goods? Explain.

- Is it conceivable that any of today's so-called developing nations will achieve a comparative advantage when its economy has a special ability to provide industrial goods and services? Explain. (Remember that this speculation must account for what the economic state of today's industrialized nations will be at that same point in time.)
- Considering the present international marketplace, it would seem to be to the advantage of private industry in the Western trading nations that the developing and underdeveloped nations maintain a complementary comparative advantage (i.e., other than manufactured goods). Determine whether or not class members agree with this. Have them cite reasons for their opinions.
- If the above could be considered an accurate appraisal, can that fact be reconciled with the economic and political aspirations of the non-Western, developing nations? Explain.

3 It has been suggested that, since circumstances in the United States from 1807 to 1812 forced the country to turn from shipping to manufacturing, this less efficient employment of labor and capital eliminated the United States' comparative advantage for nearly a decade. Obviously, the eventual growth of manufacturing in this country soon permitted this advantage to be reestablished with industrial goods.

Appoint a committee of students to consider the following and report to the class. Discuss questions that arise.

- How would American economic history have been changed had the United States been more conciliatory in its foreign policy, thus reducing or delaying the development of industry at home?
- Would the inevitable industrial development of America have been merely postponed or severely retarded? Explain.
- What similarities and differences are there between this situation and that of developing nations today?

RESOURCE MATERIALS:

Population Bulletin. Population Reference Bureau, 1755 Massachusetts Avenue, N.W., Washington, D.C. 20036.

Witchel, Jess, and Sanford, D. G. *An Introduction to the American Economy*. Boston, Massachusetts: D. C. Heath and Company, 1967, pp. 194-200.

environmental education curriculum infusion units

general units

for grades 7-12

The six units which follow* might be variously designated: social studies; social studies/science; science; or environmental studies. They were developed for use in the middle and junior high school grades. Their precise designation and grade level utilization is left to the user of this manual, presuming that the interests of the students, the resources available, and the local issues prevalent will aid in these determinations. For these reasons also, there are no specific syllabus references for the units.

The Value of Wetlands
Preserving Trees
The American Lifestyle of Over-Consumption
Jet Noise
Open Space and Urban Planning
Diversity in Trees and People

GENERAL UNIT

The Value of Wetlands

ENVIRONMENTAL REFERENCES: Natural Environments: Habitats (Wetlands)
Land Use: Planning
Solid Waste: Disposal methods

OBJECTIVES:

- To develop an understanding and appreciation of the ecological and economic value of undisturbed wetlands
- To explore the process of sanitary landfill, and the rationale for its use
- To analyze the conflicting environmental problems related to disposing of solid waste by filling wetlands

PROCEDURES:

1 Take the class on a trip to a nearby estuary, salt water marsh, or fresh water marsh. Conduct explorations to seek answers to the following questions.

- What are wetlands?
- How do wetlands differ from other land forms?
- What role do wetlands play in natural interrelationships?
- What kinds of plants and animals are found in the wetlands? Collect animal specimens for study, making sure to return them to their natural habitat before leaving the wetlands.

2 When in the wetlands, secure a small sample of water for microscopic examination. If possible, use a microprojector in addition to individual microscopes. After examining drops of the water, compare with water from a faucet, a fresh water pond, and the ocean.

- How many different kinds of organisms can be seen?

- How is it possible to tell that they are alive?

- Is is possible to see how the small animals get their food?

- How many of these organisms can be identified by using a simple guidebook?

- Which of the organisms in the various samples of water are different? Which, if any, are the same?

- What role do these organisms play in the food web of the wetlands?

- How can one tell whether these organisms are small animals and plants, or bacteria?

3 Based on the organisms seen at the wetlands visited, prepare a food web either on paper or by using students to "role play" the different plants and animals.

- What is the basic source of energy in any food web?

- What is the difference between a food chain and a food web?

- How many different food chains are in the web formed by the class?

- What happens to the web if any organism is removed?

4 Borrow the film "A Marsh Is Not a Wasteland" from the New York State Department of Environmental Conservation Film Library. After viewing the film, discuss the following questions:

- What different opinions do people have about marshes and their importance?

- In what different ways are marshes used by local communities?

- Why is it important that marshes be left undisturbed by man?

5 Borrow the film "Sanitary Landfill-Open Dump Conversion" from the New York State Department of Environmental Conservation Film Library. After the film, discuss the following questions:

- What is "open dumping?"

- How does sanitary landfill differ from open dumping? What are its advantages?

- What different methods of sanitary landfill are there?

- What method of disposing of waste does the community use?

6 Take the class on a trip to a nearby landfill. Find answers to the following:

- When was the landfill started?
- How much longer will it be before the limits of the area are reached?
- What was the area like before the landfill?
- What plans are there for future use of this area once the landfill is completed?
- What kind of landfill system is used at the site?
- What makes up most of the solid waste in the landfill?

7 Conduct a class discussion on the solid waste problem and on the apparent need for places to dispose of waste.

- Why is there so much solid waste?
- What, if anything, can be done to cut down on the amount of solid waste that has to be disposed of? Consider recovery, reuse, and recycling.
- How can consumers help to cut down on the amount of solid waste to be disposed of?
- What can the class do to help?

8 Solicit student opinions about the trade-offs connected with the two conflicting problems of protection of wetlands and the solid waste disposal problem. Have them share their opinions and analyze together how they think their community should resolve the problems.

RELATED ACTIVITIES:

- Invite a local environmentalist or a representative from the State Department of Environmental Conservation to visit the class and discuss the value of wetlands. Have the children prepare a list of questions to ask the specialist.
  - -What is the importance of wetlands, in general?
  - -Are any of the wetlands in the local community endangered? If so, in what ways?
  - -What groups exist in the local community to work for the preservation of wetlands?
  - -To what extent have the plants and animals in the local wetlands changed during the past five or ten years?
  - -What areas, if any, in the local community have been built on landfill?

- Build a model of a landfill using sand or gravel, cut-up paper to simulate the solid waste, and a piece of sod as the covering layer.

- What steps has the State of New York taken to protect tidal wetlands?

- What steps have been taken to protect fresh-water wetlands?

- Conduct a drive in the school to cut down on the amount of paper consumed.

RESOURCE MATERIALS:

Amos, William H. *Life of the Seashore*. New York: McGraw-Hill Book Company, 1966.

Experiments in Science: Microscopic Life. New York: McGraw-Hill Book Company, 1967.

Johnson, Gaylor, and Maurice Bleifeld. *Hunting with the Microscope*. New York, Sentinel Publishers, 1974.

A Marsh Is Not a Wasteland. New York State Department of Conservation Film Library.

National Environmental Education Development. *Adventure in Environment*. Morristown, New Jersey: Silver, Burdett, 1971.

Miering, W. A. *Life of the Marsh*. New York: McGraw-Hill Book Company, 1967.

Sanitary Landfill - Open Dump Conversion. New York State Department of Environmental Conservation Film Library.

Science Curriculum Improvement Study. *Organisms*. New York: Rand McNally, 1970.

GENERAL UNIT

Preserving Trees

ENVIRONMENTAL REFERENCE: Resources: Renewable; Forests

OBJECTIVES:

- To understand and appreciate the importance of trees in an urban environment

- To initiate a multifaceted action program designed to save and preserve trees

PROCEDURES:

1 Take the class on a trip to a botanical garden or tree nursery. Ask them to observe the following.

- How do the trees differ from each other?
- In what ways are they all alike?
- How are the trees cared for?
- How do you feel when you see or are around trees?
- How many different kinds of trees and shrubs are in the garden or nursery?

2 Upon returning to the classroom, form committees and report on the following.

Committee #1

- What role do trees play in the life cycle of all living things?
- How do trees affect their environment?
- Why do people plant trees?
- What are the needs of trees? How are these needs met in a forest? A botanical garden? A nursery? In the community?
- Given proper care, what is the life expectancy of some common trees?

Committee #2

- Make a survey of trees on and around the school grounds. Include:

  -What are the kinds of trees?
  -When were they planted and by whom?
  -Who cares for them?
  -What condition are the trees in?
  -Do they have any special needs compared to trees in the forest?
  -Does the population of the school and neighborhood do anything to damage the trees?

Committee #3

- Plan and carry out action projects in and around the school that would preserve and prolong the life of the trees. This might include:
  -asking representatives of local garden clubs, environmental groups, or similar organizations to instruct the committee on tree care

- -keeping the soil around trees free of rocks and litter and the soil aerated
- -protecting the trees by putting screens or fencing around them
- -writing to community and state agencies for material on the care of trees
- -preparing a slide presentation, with a script, on the value and care of trees to be used at assemblies or by emissaries to other classes to get the message across to the school community

Committee #4

- Make a search of the classroom to identify all items which are products of trees.

- Conduct a study of the use of trees for paper.

  - -How many trees are needed to produce one ton of paper?
  - -Approximately how much paper does the class use in a day? A week? A year?
  - -How many trees are needed to supply the class with a year's supply of paper?
  - -How much paper is wasted by the class? How?
  - -List the ways in which paper could be conserved, reused, recovered, and/or recycled.

- Extend the paper-saving program (including recovery, reuse, and recycling) to the entire school.

- Have children prepare memo pads from scrap paper and distribute the pads to other classes.

- Consult a local environmental group to determine the feasibility of instituting a school-wide recovery program of office paper wastes for sale to a carter. Have the class assume the responsibility for the logistics of such a program.

RELATED ACTIVITIES:

Involve the class in the following evaluative questions:

- Has the amount of paper waste in the school decreased markedly as a result of the dual campaign to cut down on the amount of paper used and to recover office paper waste for recycling?

- Can practical recovery for recycling programs of this nature be devised in a school? Is it possible to find a carter willing to pick up such relatively small amounts of paper? Is it practical to store the paper until it is picked up? Does the amount of time and effort involved in the activity conflict with the other demands on students' and teachers' time?

- Do the students find themselves becoming more aware of their consumption and overconsumption of paper? What are the indications of this?

- Do the students enjoy their tree-maintenance program as a long-range activity? Explain.

- Are the students more aware of trees than they were when the unit began? How is this evidenced?

- Are the students more responsible in their handling of products made from trees? Give examples.

RESOURCE MATERIALS:

Audubon Tree Study Program. New York: National Audubon Society, 1974.

Green Places in City Spaces: Caring for City Trees. (Teachers' Packet). Environmental Action Coalition, 235 E. 49th Street, New York, N.Y. 10017. 1974.

A Place to Live. New York: National Audubon Society, 1974.

Rogers, Matilda. A First Book of Tree Identification. New York: Random House, 1951.

World Around Us - Environmental Education Packet. Garden Club of America, 588 Madison Avenue, New York, N.Y.

GENERAL UNIT

The American Lifestyle of Over-Consumption

ENVIRONMENTAL REFERENCES: Consumerism: Consumer information; Packaging
Economic/Social/Cultural Environments: Aesthetics

OBJECTIVES:

- To examine and analyze personal consumption habits

- To educate students to make choices as consumers which will be beneficial to their health, to the economy, and which will help conserve natural resources and help improve the environment

PROCEDURES:

1 Introduce the subject of environmentally sound consumerism to the the students by bringing to class several different brands of a common food item such as peanut butter. Discuss the following:

- How do these different brands compare in general appearance: color, price, weight, ingredients, and taste? Record the findings on a chart.

- Which, if any, do you prefer? Why? How do these preferences relate to appearances, price, weight, and ingredients?

- Which of these brands do your families use? Who in the family decides which brand is bought? On what basis? Have students check with their parents if they do not know the answer to these questions.

- What does "house brand" mean? Which of the brands studied are house brands? How do they compare to the name brands?

- What are the factors which influence people to buy certain brands?

- What can we learn about a product by reading the label?

- What are food additives? Which of the brands observed had additives?

2 Conduct a class study to learn what ingredients are in six or eight popular brand name food products ("X" soup, "Y" cereal, "Z" white bread). Use products suggested by the class. Have students go to the local supermarket, read the labels, and record the information on a chart.

- Which of these products contain additives?

- Why are additives used?

- Do we need additives? Explain.

- Are there reasons for avoiding their use?

- What role does the government play in protecting consumers from harmful or unnecessary additives?

- In what other ways does the government protect consumers?

- Which agencies has our city set up to protect consumers? Our State? The United States?

3 Conduct a consumer price comparison survey. Discuss with the class that one aspect of good consumerism is comparative shopping. Set up a comparative shopping chart.

- How do the ingredients in the house brand compare with those in the name brands studied? How does the price per ounce compare?

- Did all of the stores surveyed have house brands?

- Does the price of the name brand product vary from store to store? If so, what might account for this?

- What does "caveat emptor" mean?

- If a house brand is cheaper than a name brand, and of equal quality, why do people buy the name brand?

- Why do some people shop in the most expensive stores?

4 Analyze the role of advertising in consumerism by considering the the following:

- How can we make advertising work for us? With the class, plan a satisfying and nutritious dinner. Decide on the quantities needed for a family of four. Divide the class into committees. Ask students to bring in copies of the pre-weekend newspaper and study the food store advertisements as a preliminary to their imaginary shopping expedition. Have committees compare their decisions and the total cost of their dinner.

  -Which varied more in price: staples or meat and produce?
  -What is a "loss leader"?
  -Did the newspapers carry coupons offering any of the items free or at a reduced rate? How can companies afford to make these offers?
  -If convenience foods were to be used, what difference, if any, would it make on the cost and nutritional value of the meal?

- How does advertising work against us? Have students make a list of the various ways companies advertise their products (newspapers, magazines, radio, television, billboards, self-advertising packaging). Bring in a collection of newspaper and magazine ads. Listen critically to radio and television commercials.

  -What methods do companies use to sell their products?
  -How well do claims made by advertisements compare with the reality of the products' performance? (Set up classroom tests to check some of these claims.)
  -How can publications such as Consumer Reports help determine the truth behind advertising claims?
  -What effect does advertising have on the amount of consumption in America?
  -Do we need all of the products we buy? Do we have items at home which we bought because of advertising and do not really use?
  -In what ways do retailers encourage "impulse" buying?

5 Plan a consumer questionnaire to use as a survey to learn about the consumer habits of adults the students know. (See page 187.) Have students devise the questions, decide who should be polled, conduct and survey, and tally the results.

- What trends were observable?

- Were inconsistencies noted? For example, did many respondents indicate that they bought name brands but claim they were not influenced by advertising?

- Did many people state that they have bought things they did not really need? Why did they make the purchases?

6 Pose the question, "Do we as a nation overconsume?" Encourage students to report on the huge quantities and varieties of foods and other products found in supermarkets. Ask them to note where some of these foods come from.

- Do Americans eat and live better than people in some of the countries from which we import specialty foods and other products?

- If an affluent country such as the United States can afford a higher standard of living and have more than people in other countries, do we also have a right to keep on consuming food and other products at an ever increasing rate?

- Do we have a right to continue selling and buying products made from or dependent on natural resources which have become scarce?

- Is the present economic "crunch" having an effect on our family and our national buying habits? Explain.

7 Discuss "planned obsolescence." Have we fallen into the habit of throwing away what we have and buying more? What evidence is there of this?

- Study the three photographs on page 192 and describe the social and consumer attitudes which lead to such conditions. What steps can be taken to correct these and similar situations?

- Ask students to photograph similar scenes in their neighborhoods, present them to the class, and offer suggestions as to causes and solutions for such conditions.

8 Involve the class in the following evaluative questions.

- Since starting this unit, have you asked your parents to buy an item you heard advertised on television or radio? Explain.

- Do your parents check the price per ounce on an item before buying it now? Why, or why not? Explain "unit pricing."

- Will such checking be easier or more difficult when we convert to metric units? Explain.

- Do your parents read labels to see if the food item contains additives? Why, or why not?

- Have you "thought twice" before throwing away an old toy? To what purpose?

CONSUMER SURVEY

		YES	NO	COMMENTS
1.	Do you buy brand-name products? Why, or why not?			
2.	Do you ever buy "house brand" products? Why, or why not?			
3.	Do you believe the claims made in advertisements? Why, or why not?			
4.	How does advertising influence your buying?			
5.	Do you switch from one brand to another? Why, or why not?			
6.	Do you think we need so many different brands for the same products? Explain.			
7.	Do you think we need the chemical food additives put in our foods? Why, or why not?			
8.	If you buy a product that doesn't live up to its advertising claims, do you complain to anyone? To whom, or why not?			
9.	Do you think the Food and Drug Administration is doing a good job to protect the public? Explain.			
10.	(a) Do you use "convenience pre-packaged" foods? Why, or why not? (b) If yes, what difference does it make in your food budget?			

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RELATED ACTIVITIES:

- Bring in a collection of catalogs from mail order houses and give each student a set sum of "money" to spend. Encourage them to select wisely on the basis of best quality for least cost and of least harm to the environment. Give consideration to items that are really useful and durable rather than frivolous.

- Prepare a display for a corridor bulletin board or showcase of items from a supermarket that show wise versus unwise consumption habits.

RESOURCE MATERIALS:

Consumer Reports. Consumer's Union of the United States, Inc., 256 Washington Street, Mount Vernon, N.Y. 10550.

Food Habits and Customs. Filmstrip. Popular Science Publishing Company, 355 Lexington Avenue, New York, N.Y. 10017.

Unlimited Wants - Limited Resources. Filmstrip. Popular Science Publishing Company, 355 Lexington Avenue, New York, N.Y. 10017.

What's the Price? Filmstrip. Wayne State University, Audiovisual Productions Center, 680 Putnam, Detroit, Michigan 48202.

GENERAL UNIT

Jet Noise

ENVIRONMENTAL REFERENCE: Pollution: Air; Noise, traffic

OBJECTIVES:

- To collect data for documenting the harmful effects of jet noise

- To participate in action programs designed to minimize this form of environmental pollution

PROCEDURES:

1 Take the class on a neighborhood walk to listen to sounds. Ask half of the class to listen for natural sounds and half for sounds created by humans. Record all of the sounds heard in five minutes.

  - Which list was longer? Why?

  - Were any sounds noted which we are not usually conscious of hearing? If so, what might explain them?

- Which sounds might be generally considered pleasant? Which would be considered unpleasant?

- Why are some sounds more pleasant than others?

2 Form a committee of students to study the results of research conducted to determine the effect of noise pollution on hearing. Have them share their findings with the class.

3 Use a city street map (and a town or county map) to locate the school and nearby airports. Discuss flight patterns and relate them to the problem of jet noise over the school. Set up a procedure for determining the amount of instructional time lost due to airplane noise.

- How does weather affect flight patterns?

- When does the airplane noise seem to be more annoying? What influence does the weather, time of day, or day of week seem to have?

- For how many seconds does the noise of one plane disturb the class?

- Is the disruption limited to the actual passage overhead of the plane? If not, approximately how much time is lost before a lesson can be resumed?

- During a two-hour period on a given day, how many planes pass overhead? What is the average amount of time lost per plane? Approximately how much time is lost in one day? How much is lost in one week?

4 Invite a representative from the local Environmental Protection Agency or from the airport to speak to the class about noise abatement programs and their progress.

- What are the local laws dealing with noise pollution caused by jet planes?

- What effort is the aviation industry making to decrease jet noise?

- Has there been any progress in this regard during the past few years? What progress can be expected in the future?

- What can be done to hasten the progress of jet noise abatement plans?

- What are some of the reasons better progress has not been made?

5 Plan an action program designed to speed up jet noise abatement plans. Prepare a petition to be signed by parents and neighbors to be sent

to public officials and the aviation industry. Prepare posters encouraging other students in the school to join the anti-jet noise campaign.

- What is a citizen's responsibility in connection with a pollution problem?

- What is the wording regarding responsibility which is to be used on the petition?

RELATED ACTIVITIES:

- Have students project some of the reactions they will get from public officials and the aviation industry in response to their petition.

- Are Americans willing to make whatever sacrifices are necessary, such as convenience and increased travel time, to rid society of jet noise pollution? Explain.

RESOURCE MATERIALS:

Noise Pollution (Audubon Conservation Fact Sheet). New York: National Audubon Society.

Noise Pollution Code. New York City Environmental Protection Administration.

To Conserve and Protect. 14 1/2 min. Color. Time-Life Films, 43 W. 16th Street, New York, N.Y. 10011.

GENERAL UNIT

Open Space and Urban Planning

ENVIRONMENTAL REFERENCE: Land Use: Reclamation; Urban renewal

OBJECTIVES:

- To develop an understanding and appreciation of the environmental importance of the waterfront

- To explore the most ecologically sound uses for waterfront property

- To investigate zoning regulations in the students' own neighborhood

PROCEDURES:

1 The procedures and activities are based upon an actual New York City environmental issue. Use the issue as a generally applicable (conceptually) case study.

During a current events period, focus students' attention on newspaper articles related to developers' plans for landfill and high-rise construction along the community's waterfront. Discuss with the class the effects such a development might have on their suburban-like neighborhood.

- How do the children feel about the projected buildings to be put up at the water's edge?
- How do their parents feel about it? Why do their parents feel as they do?
- Would construction of these high-rise buildings be a natural step in community improvement and "progress?"
- Do the children think the community can accommodate an enlarged population? Why, or why not?
- What services should a community be able to supply its residents?
- What steps will be taken before a final decision is reached? Who will make the final decision?
- What is the community planning board? Who are its members? What efforts does the planning board undertake to learn community opinion?
- Do the children expect their parents to attend the planning board hearing? Why, or why not?
- How could the class become better informed about the problem in order to develop knowledgeable opinions about the outcome they would want?

2 Discuss the information the class would need to help them study the problem. Questions such as the following might arise.

- What is the community's history and background?
- Do the same kinds of people still live there?
- What types of houses are in the community now (single-family detached, townhouses, two-family houses, duplexes, garden apartments, high-rise apartments)? Where are these different types in relation to the water's edge?

- How is the water's edge used now (residences, industry, clubs, other uses)?

- How much vacant land is there along the water's edge? How much is privately owned? How much is owned by the public?

- Is the waterfront considered "wetlands" area? Explain.

- Is there any landfill on the waterfront? (It may be necessary to define landfill before this question can be answered.)

- Can the local services accommodate an enlarged population? Why, or why not?

- How does the community feel about any projected development?

3 Ask the class to organize committees to obtain the information they are seeking. Have each committee plan its own activities and questions.

Committee #1: History of the Community

Questions:

- How long ago was the community used as farmland?

- When was the first apartment house built?

- How was the waterfront property used in earlier days?

- What changes have taken place in the past 5 to 10 years?

Activities:

- Obtain a copy of the oldest available map of the community and observe the changes that have occurred during the last 10 years.

- Interview long-time residents and get their views on how the neighborhood has changed.

- Borrow old pictures, mememtos, and newspapers, and set up a school showcase in the school corridor.

Committee #2: Public Facilities

Questions:

- What public services and facilities does the community have?

- Can these present facilities and services accommodate the needs of an expanded community? Explain.

- Which of these facilities or services would have to be increased?

- Which of these facilities or services would benefit from an increased population?

Activities:

- Set up appointments to interview the school principal, fire chief, police captain, bus dispatcher, manager of a supermarket, etc. In each case find out whether their service will be available or adequate for an increased population.

- Record the information obtained from the above survey on a chart, such as the sample below.

	Unable to Service Increased Population	Able to Service Increased Population	Will Benefit From Increased Population
Service			
School			x
Library			x
Hospital	x		
Firehouse		x	
Others			

Committee #3: Questionnaire

Questions:

- How can the committee find out what the community thinks about the projected housing development?

- How is a questionnaire set up?

- What questions does the committee want answered?

- To whom should the questionnaire be given?

- How should the questionnaire be distributed? What rules and safety precautions should be observed in distributing the questionnaire?

- How should the results be compiled and analyzed? How should they be reported, and to whom?

Activities:

- Prepare a questionnaire to meet the requirements decided upon by the committee. A sample appears below.

Name ______________________________

Address ______________________________

____

Occupation ______________________________

Age (optional) ____ under 20 ____ under 40
____ under 30 ____ over 40

Residence: ____ private house ____ rented residence

How would you like this piece of land used?

___ as is (cleaned up) ___ apartment (high-rise)

___ youth center ___ recreational center

___ parkland ___ private houses

___ other uses ______________________________

____

____

- Distribute the questionnaire to teachers, neighbors, storekeepers, and others.

- Record and tally the responses.

- Report the findings to the class. Prepare an article for the school newspaper reporting the survey and the findings.

Committee #4: Waterfront

Questions:

- What are "wetlands"?

- Is the land under consideration "wetlands"?

- How are wetlands protected in New York State?

- Has any part of the waterfront area had landfill?

- Is there any public access to the waterfront at present?

Activities:

- Take photographs of the waterfront area on which the developer plans to build high-rise apartment houses.

- Research the provisions of the New York State Tidal Wetlands Act.

- Set up an exhibit showing in miniature what landfill is and how it is used.

Committee #5: Planning

Questions:

- What are the details of the development under consideration? How high would the buildings be? Would there be any public access to the waterfront? Would the view of the water be blocked by the buildings?

- What are the community's specific objects?

- What recommendations does the community planning board make, if any?

- How would the "planning committee" for the class recommend the land be used?

Activities:

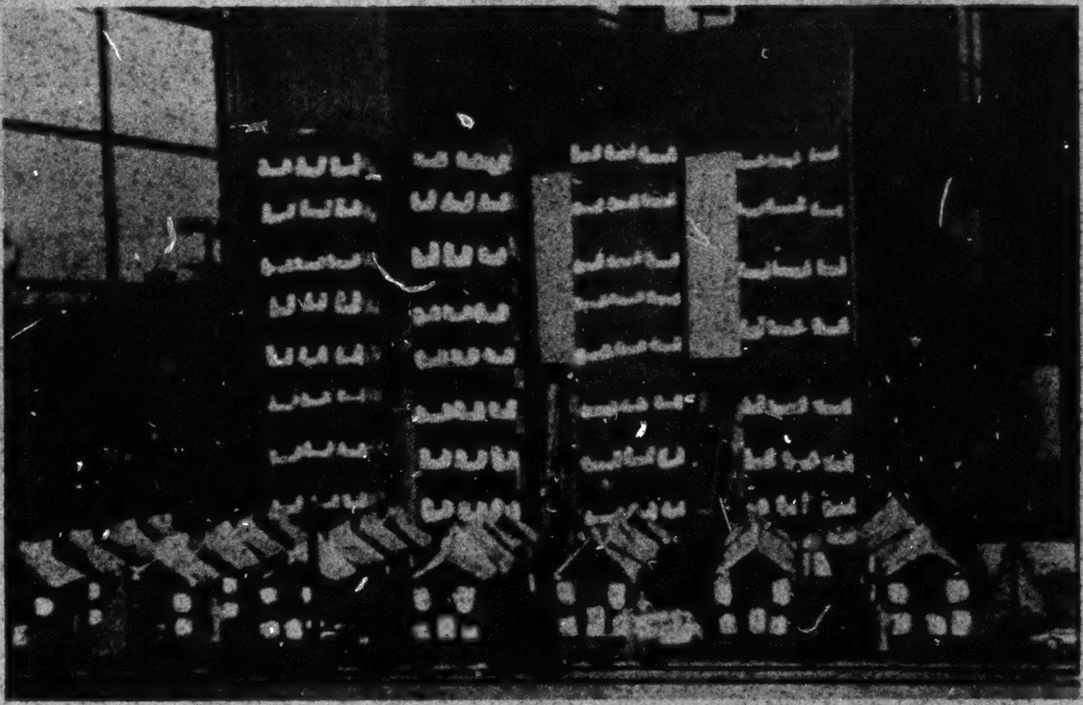
- Obtain a detailed map of the area under consideration. Use it as a basis for class discussion and for model building.

- Set up bulletin boards and maintain notebooks of the newspaper clippings concerning a proposed housing development.

- Attend a community planning board hearing and note the opinions and facts offered. Report to the class on the hearing, and distinguish between "fact" and "opinion."

- Plan a role-playing community planning board hearing in the classroom.

- Prepare two table-top models of the committee's plans for the area. Show how it should be designed if the developer succeeds in getting permission to use landfill and build high-rise apartments, and how the students would like to see the waterfront property used based upon their understanding of community needs. The photograph on the following page offers an example of a model development.



4 Plan a panel discussion in which a representative of the community, a local storekeeper, an environmentalist, and an architect representing the point of view of the builder are invited to participate. Ask the moderator to direct the discussion toward answering the following questions.

- How should waterfront property be used?
- How great is the need for more housing in the area?
- Explain how the greatest number of people can benefit from the waterfront: through high-rise apartments; through private housing; or in some other way.
- Is it economically feasible for the city to buy the land and maintain it for public use? Explain.
- Can the community handle a larger population without any harmful effects? Explain.

RELATED ACTIVITIES:

- Plan an assembly program in which each committee presents a brief skit summarizing its findings.

- Divide the class into five student mock planning boards. Ask each group to meet as a "board" and decide how it would resolve the question concerning the use of the land. Instruct the students to be as objective as possible, and to keep in mind all of the information they gathered during their study of the problem.

RESOURCE MATERIALS:

Decent Burial. New York State Department of Environmental Conservation Film Library, Albany, N.Y. 12201

Sanitary Landfills. New York State Department of Environmental Conservation Film Library, Albany, N.Y. 12201

Sanitary Landfill - Open Dump Conversion. New York State Department of Environmental Conservation Film Library, Albany, N.Y. 12201

Spitzer, E.F. "Solid Waste Demonstration Programs; Sanitary Landfill Operations," American City, July 1971, pp. 58-60.

GENERAL UNIT

Diversity in Trees and People

ENVIRONMENTAL REFERENCE: Economic/Cultural/Social Environments: Cultural identity - pluralism

OBJECTIVES:

- To increase students' powers of observation
- To recognize that diversity in a biological community leads to stability
- To develop awareness of cultural pluralism
- To examine the advantages and disadvantages of diversity in a human community

PROCEDURES:

1 Ask each student to draw a tree. Compare the drawings. Note that although they are all somewhat different, trees have recognizable similarities.

- In what ways were all of the trees similar?
- What other features do all trees have in addition to those drawn?

- What are some of the ways trees are different from all other living things? How do you know that a tree is a tree?

2 Take the class on a trip to a conservation center, a botanical garden, or a wooded local park. Focus attention on the trees present.

- How many completely different kinds of trees can be seen (not just short or tall, thin or thick)?

- In what ways do these trees differ from each other? (Students might collect seeds; make leaf prints or bark rubbings; draw leaf scars; note branching, etc.)

- Which type of forest do you think would be more interesting to walk through: one with many different kinds of trees, or one with just a single species? Explain.

- Which type of forest do you think would be healthier and more stable: one with many different kinds of trees, or one with just one species? Why?

- Can the class agree on which of the trees in the forest is "the best?" If not, why not? Elicit two conclusions they might have trouble reaching: people's tastes differ; the word "best" implies a value judgment, and who is to say what is "best?"

3 Conduct a class discussion in which the students recall that trees are similar in some ways, and different in others. Ask them if this is true of people.

- What are the ways in which all people are alike? Compile a list.

- What are the ways in which people are different from each other? Compile lists under several headings: physical appearance; personality; social factors; etc.

4 Conduct a survey of the ethnic backgrounds of the students in the class. Prepare a chart on which can be entered the country of origin of the students' parents and grandparents.

- Does the class have a varied heritage? Explain.

- Is there any predominant pattern? Is there any way to account for such a pattern if it exists?

- What are some of the manifestations in the students' homes of their ethnic backgrounds (celebration of holidays, language spoken, foods eaten, etc.)?

5 Plan an "international luncheon" with the students and their parents. Arrange for as many parents as possible to prepare a dish from their native land for the luncheon.

- How many children like foods from other national backgrounds?

- Is it possible for the class to agree on which of the foods at the luncheon was "best"? If not, why not?
- Is it possible for people to say which ethnic group is "best"? If not, why not?
- Which type of community would be best to live in: one with a "monoculture," or one with diversity? What are the advantages of each? What are the disadvantages of each?

RELATED ACTIVITIES:

- Discuss with the class other aspects of diversity from which their community benefits.
- How do other communities compare with yours in terms of diversity?
- Are there other communities in which you would prefer to live? Explain.

RESOURCE MATERIALS:

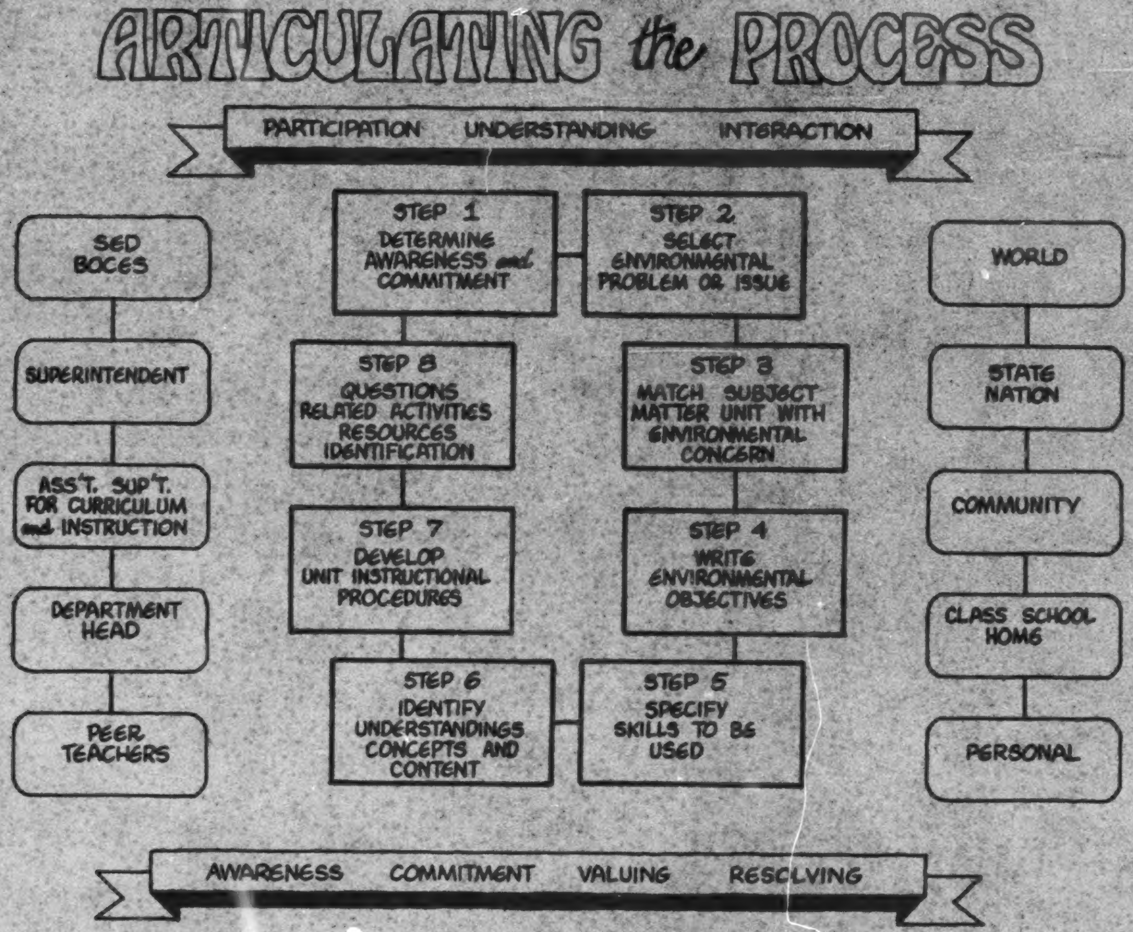
Audubon Tree Study Program. New York: National Audubon Society.

"Strands," Adventure in Environment. National Environmental Education Development, National Parks Service.

Zim, H.S. Trees. New York: Golden Press, 1952.

APPENDIX A - ARTICULATING THE PROCESS

This schematic illustrates the steps in the environmental education curriculum infusion process which is developed and described in the New York State Education Department publication, Designing an Environmental Curriculum... A Process.


ARTICULATING the PROCESS
PARTICIPATION
UNDERSTANDING
INTERACTION
SED BOCES
SUPERINTENDENT
ASS'T. SUP'T. FOR CURRICULUM and INSTRUCTION
DEPARTMENT HEAD
PEER TEACHERS
STEP 1 DETERMINING AWARENESS and COMMITMENT
STEP 2 SELECT ENVIRONMENTAL PROBLEM OR ISSUE
STEP 3 MATCH SUBJECT MATTER UNIT WITH ENVIRONMENTAL CONCERN
STEP 4 WRITE ENVIRONMENTAL OBJECTIVES
STEP 5 SPECIFY SKILLS TO BE USED
STEP 6 IDENTIFY UNDERSTANDINGS CONCEPTS AND CONTENT
STEP 7 DEVELOP UNIT INSTRUCTIONAL PROCEDURES
STEP 8 QUESTIONS RELATED ACTIVITIES RESOURCES IDENTIFICATION
WORLD
STATE NATION
COMMUNITY
CLASS SCHOOL HOME
PERSONAL
AWARENESS
COMMITMENT
VALUING
RESOLVING

APPENDIX B - CATEGORIES OF ENVIRONMENTAL ISSUES, PROBLEMS, AND CONCERNS

Chemical, Biological, and Radiological Contamination

- Agricultural chemicals
- Pesticides, fungicides, herbicides, insecticides
- Metal poisoning
- Detergents
- Plant and animal diseases
- Pests
- Mine tailings
- Radiation (microwave, etc.)

Consumerism

- Packaging
- Advertising
- Product durability
- Consumer information
- Impulse buying
- Status products

Economic/Social/Cultural Environments

- Aesthetics
- Lifestyle
- Housing
- Jobs
- Poverty
- Trade balances - comparative advantage
- Civic responsibility
- Cultural identity - assimilation
- Cultural identity - pluralism
- Communications

Energy

- Power generation
- Fuel supplies
- International trade policies
- New systems and concepts (geothermal, solar, nuclear)

Environmental Planning and Design

(see also Land Use and Pollution: Visual/Aesthetic)

Health

- Pollution
- Food additives
- Drugs
- Stress (congestion, population density; competitiveness,
- Recreation and environment

Land Use

- Reclamation/flood control
- Construction
- Strip mining/erosion
- Planning
- Recreation
- Open space/scenic and historic preservation
- Real estate
- Urban renewal

Natural Environments

- Habitats
- Endangered species
- Communities/ecosystems
- Survival

Pollution

- Air
  - Particulates
  - Engine emission
  - Incineration
  - Industrial effluent
  - Smog
- Water
  - Flood control
  - Sedimentation
  - Thermal discharges
  - Soft and solid waste (See also Solid Waste.)
  - Agricultural runoff
  - Municipal sewage systems
  - Limnology
- Noise
  - Traffic

- Construction
  - Industrial
- Visual/Aesthetic
  - Signs and billboards
  - Construction design
  - Transmission lines
  - Landscape architecture
  - Graffiti

Population

- Distribution and density
- Growth rate
- Migration
- Mobility
  - and food supply
  - and resources

Resources

- Recycling
- Renewable
  - Soil
  - Water
  - Forests
  - Fishery and wildlife management
- Nonrenewable
  - Minerals
  - Fossil fuels (See also Energy.)

Solid Waste

- Recycling
- Recovery
- Disposal methods
- Source reduction (packaging)

Transportation

- History
- Mass transit
- Motor vehicles and highways
- Aircraft and airports
- Safety
- Traffic congestion
- New systems and concepts
- Mobility

APPENDIX C — ENVIRONMENTAL EDUCATION INSTRUCTIONAL OBJECTIVES

An important part of the curriculum design process involves the development of performance objectives which are to be included in the modified curriculum units. The objectives provided below may prove to be useful as they are stated, or as guides in the development of a teacher's own objectives. If our goal is to educate individuals to understand the need for effective participation in the social processes which affect life, through an awareness of environmental problems and the consequences of a lack of solutions for them, then a student should be able to do the following.

1. Identify the problems affecting society's environment, through reading, investigation, and reporting.

2. Relate data from other disciplines to the subject area in which an environmental problem is studied.

3. Analyze and interpret the decisions society makes affecting the environment.

4. Identify and enumerate a society's values that affect the environment.

5. Demonstrate a grasp of the principles and generalizations of an ECOSYSTEM.

6. Identify problems which occur as a result of population growth.

7. Analyze the effects of urbanization of his environment.

8. Discuss the limitations and restrictions society places upon itself in the name of survival. (e.g., limitations on disposal of private property).

9. Identify the historical basis for the condition of the current environment.

10. Demonstrate an awareness of local, state, and national efforts to protect the environment.

11. Prepare simple questionnaires for gathering information about community reactions to local environmental problems.

12. Develop a means to share environmental information with schoolmates, parents, and community.

13. Cite common factors in local, national, and international environmental concerns.

14. Design and test hypotheses to explain environmental problems in the community.

15. List 10 of the world's most serious environmental problems.

16. Contrast the use of the environment by peoples of other times and places with present use.

17. Describe some of the governmental processes (local, state, Federal) which influence the quality of our environment.

18. Explain how different cultures influence the physical factors in the environment.

19. Demonstrate an awareness of environmental problems by recognizing them in the community and by reacting to news items about them.

20. Initiate letters to local officials and newspaper editors suggesting solutions for local environmental problems.

21. Conclude that America, as a leader in technological advancement, is obliged to help the world meet its energy and food needs.

22. Show a concern for the welfare of the starvation-level nation by contributing money and nonperishable foods through local or national charitable organizations.

23. Recognize and describe the limits of the earth's energy resources.

24. List and describe present and alternative sources of energy.

25. Make informed judgments on energy sources in terms of environmental impact.

26. Communicate concerns for the environment.

27. Recognize the need for open space and identify the tradeoffs that would be required.

28. Identify attitudinal changes toward environmental problems.

29. Participate in action programs planned to counter a specific environmental problem.

30. Critically examine the ecological implications of technological "advances" before endorsing them (examples: SST, catalytic converters, geothermal energy, etc.).

31. Analyze options and select those least harmful to the environment.

32. Record, document, and report observations of environmental issues.

33. Demonstrate a willingness to forgo enjoyable activities that upset the environment.

34. Defend "concerns" for the environment.

35. Refrain from abusing public parks and areas.

36. Dispose of wastes more intelligently and consider long-range consequences to the environment.

37. Differentiate between renewable and nonrenewable resources.

38. Categorize the world's resources as renewable or nonrenewable.

39. Discuss the ramifications of continued "unlimited conspicuous consumption."

40. Relate consumption habits to resource depletion.

41. Identify some renewable and nonrenewable resources in danger of depletion or extinction.

42. Explain the purpose of resource management.

43. Promote the elimination of wasteful consumption habits of nonrenewable resources.

44. Analyze the problems affecting the environment.

45. Defend and support with facts a position taken concerning possible solutions to an environmental problem.

46. List and describe pollutants of the environment.

47. Identify and assess the impact of technology on the environment.

48. Demonstrate an awareness of the importance of the oceans in the biosphere and the current and future efforts that will be needed to protect them.

49. Design a problem-solving approach to an environmental problem.

50. Explain how the physical factors in man's environment influence his culture.

51. Construct an "Environmental Bill of Rights" and an "Environmental Bill of Responsibilities."

52. Recognize visually attractive patterns in nature and utilize them as a design for manmade products.

53. Define and give examples of the following terms: interrelationship; adaptation; succession; scarcity; survival; prey-predator relation; competition; diversity.

54. Recommend specific resource material (books, magazines, governmental publications) for obtaining information about environmental issues.

55. Cite some methods that can be used to recover, reuse, or recycle waste or unused materials.

56. Specify actions which could preclude the necessity to recover, reuse, or recycle wasted materials.

57. Construct at least three reusable items from discarded materials.

APPENDIX D - ENVIRONMENTAL CONCEPTS

While attempting to relate environmental issues to subject matter areas, it is helpful to have at hand some key words or concepts which serve as bridges between them. The concepts below, with their definitions, are inherent in numerous areas of knowledge and thus common to discussions of man's natural and social existence. As such, these "common denominators," or basic concepts, should lend themselves to the task of linking environment to subject concerns, for they are fundamental to both.

(A quick reference to pages 2-5 of the Department's publication, Handbook of Environmental Education Strategies, will provide illustrations of how these concepts may be used.)

change - dynamic modification... the continuous alteration of previously existing forms, styles, and substances

diversity - the condition of being different or having differences... the characteristics of variety and dissimilarity which collectively contribute to the harmony of systems

interaction - reciprocal action or influence... exchange, stimulation, or influence between or among organisms (including man) within their environment and/or among their respective environments

interdependence - mutual reliance... an organism cannot live alone

optimism - anticipating the best possible outcome... man has the capacity to make this the best of all possible worlds

planning - detailing a program of action... decisions concerning the future must be based on long-term environmental benefits

recyclement - continuous feedback for reuse... man would do well to observe nature's example and reuse the results of his technology

right vs. responsibility - satisfying the requirements of suitability or convenience vs. accountability... man has exercised his right with little regard for his responsibility to the environment

scarcity - smallness of quantity in relation to needs... as populations increase, competition for resources necessitates the establishment of priorities

social forces - agents of change in society... society must be moved to insure the preservation of the environment

stewardship - exercising responsible care over entrusted possessions... the assumption of environmental responsibility through active participation in the management of problems succession - sequence, or the condition of time and place order... the sequence of identifiable stages as represented by the process of change in biological populations and/or in human systems

survival - continuing life (or existence) in the presence of difficult conditions... survival depends upon the ability of an organism to adjust to its environment

valuing - assessing relative worth or importance... man is endangering his chances for a better life through the very measures he employs to achieve it

APPENDIX E - ENVIRONMENTAL UNDERSTANDINGS

Some environmental understandings to be used as content for unit development and as a general group of learning expectations for environmental education are provided below.

1. Plant and animal populations are renewable resources.

2. The renewable resource base can be extended by reproduction, growth, management, and recycling.

3. Man must acknowledge that interdependence of all living things dictates the manner in which and the extent to which resources may be used.

4. Natural resources are interdependent and the use or misuse of one will affect others.

5. Social, economic, and technological changes affect the interrelationships, quality, availability, and the use of natural resources.

6. Living things are interdependent with one another and with their environment.

7. Opportunities have been provided for man to experience and enjoy nature.

8. Man has the ability to make this the best of all possible worlds.

9. The arts seem to aid man in feeling a oneness with nature and with fellow men.

10. Physical well-being is a fundamental necessity for survival even though man often places a higher value on other things.

11. Earth's resources and recycling system can support only a limited number of people; therefore, as populations increase and as resource supplies decrease, the freedom of the individual to use the resources as he wishes diminishes.

12. Man has exercised a presumed right to exploit the environment with little regard for his responsibility to preserve it.

13. Ethically, we are stewards rather than owners of the resource base.

14. Historically, cultures with high technological development have used disproportionately more natural resources than those with lower levels of technological development.

15. Individuals tend to select short-term economic gains, often at the expense of greater, long-term environmental benefits.

16. The material welfare and aspirations of a culture largely determine the use and management of natural resources.

17. The rate of resource consumption increases in direct proportion to the expansion of our wants, needs, and markets.

18. The waste of natural resources can limit the options available to future generations.

19. Resource depletion can be slowed by the development of substitutes for existing (nonrenewable) resources, prevalent lifestyles, and current priorities.

20. Natural resource policies come about as the result of interacting social processes: science and technology, government operations, private interests, and public attitudes.

21. Individuals should become well informed about the best ways to manage and conserve our energy supplies.

22. In order to preserve our threatened environment, present attitudes must change to reflect a widespread public concern which will encourage protective action by individuals, groups, and government.

23. It is the responsibility of each individual to become aware of existing governmental regulations intended to protect the environment.

24. In a democracy, people must consent to, or insist upon, restrictions on resource allocation and use.

25. Choices between essential needs and nonessential desires are often in conflict.

26. Man currently faces the prospect of endangering his chances of a better life through the very measures he employs to achieve it.

27. Although much needs to be done to improve and preserve our environment, we must stop occasionally and acknowledge the gains that are being made in these directions.

28. The prevailing condition of scarcity which underlies all economic considerations forces changes in the lifestyles of individuals and societies.

29. The limited nature of productive resources makes it imperative that a society define its economic objectives in terms of environmental reality.

30. Man must develop the technological and sociological knowledge needed to control population growth, modify environments, and alter resource-use patterns.

31. As population expands and becomes more mobile, man's demands for natural resources increase.

32. The demands of population growth coupled with man's tremendous waste of energy are responsible for some of our more serious environmental problems.

33. Raw materials and energy supplies are generally obtained from those resources available at least cost, with supply and demand determining their economic value.

34. Most resources are vulnerable to depletion in quantity and quality.

35. Any one of an environment's components, such as space, water, air, food, or energy, may become a limiting factor.

36. Natural resources are unequally distributed with respect to land areas and political boundaries, thus creating conflicts over priorities in the use, management, and conservation of these resources.

37. Trade will be mutually beneficial if trading partners specialize in those products in which they have the greatest productive efficiency.

38. The nonrenewable resource base of mineral elements is considered finite, and depletion can only be slowed by altered priorities, new demographic considerations, improved conservation practices, and vigorous recycling procedures.

39. Water is a reusable and transient resource, but the usable quantity may be reduced by impaired quality.

40. Soil, trees, and water are classified as renewable resources, but, because their renewal or revitalization requires a major investment in time and effort, they may be more realistically considered depletable resources.

41. As natural resources become scarcer, the inexhaustible supply of human energy, resolve, determination, and ingenuity must be fully utilized.

42. The Earth's main source of energy is the sun.

43. Energy is initially supplied to an ecosystem by the activities of green plants.

44. The basic function of any ecosystem is to capture and transfer energy.

45. Diversity is a key factor in the survival of an ecosystem.

46. Survival of an organism depends upon its ability to adjust to its environment. Each kind of organism represents a collection of adaptations which fit it for survival under a given set of conditions.

47. The energy requirements of man are met primarily by "food," and men are dependent upon other organisms through food chains and food webs.

48. Man changes the natural environment to the extent that many species find it diffcult to adapt to the new conditions.

49. In nature, there is a continuous recycling of many elements.

50. Man would do well to observe nature's example and recycle the results of his technology.

51. Organisms and environments are in constant change.

52. The interaction of environmental and biological factors determines the size and range of species and populations.

53. Pollutants and contaminants in the air are produced by natural and manmade processes.

54. Land forms influence the type of community in which people live.

55. Social values and morals influence environmental attitudes. Mankind is continually developing an ethical base for making value judgments.

56. Increased leisure time necessitates planning for leisure-time resources/activities.

APPENDIX F - ENVIRONMENTAL EDUCATION INSTRUCTIONAL MATERIALS

The following New York State Education Department environmental instructional materials (teachers' guides, activity manuals, filmstrips, and film) have been developed through the cooperation of the Environmental Education Task Force and the Bureau of Continuing Curriculum Development for use in interdisciplinary environmental education programs. They are listed in chronological order of development.

A key to the availability of these materials is provided below. Some publications may also be found in the school library or curriculum materials center.

*available upon request from the Bureau of Secondary Curriculum Development, Room 314 F, State Education Building, Albany, N.Y. 12234

†available on microfiche and free to New York State educators from Educational Programs and Studies Information Service (EPSIS), Room 330 EB, State Education Department. Catalog numbers are given in brackets [ ] . Hard cover copies are available from ERIC Document Reproduction Service, P.O. Box 190, Arlington, Va. 22210. Price may be found in Resources in Education.

* †Environmental Education Instructional Activities, K-6 (1970) [45 436]

Description of a variety of student activities for the elementary grades. Designed to be used in an interdisciplinary approach.

†Environmental Education Instructional Activities, 7-12 (1970) [45 437]

Description of a variety of student activities for the secondary grades. Designed to be used in an interdisciplinary manner at all grade levels and in all subject areas.

†An Environmental Experience (1970) [53 989]

Designed specifically for the observance of Conservation Day-Earth Week. Contains an accounting of a variety of experiences in which a school may engage for the purpose of involving students, faculty, and the community in action programs for environmental improvement.

* †Handbook of Environmental Education Strategies (1972) [66 298]

Contains details describing methods of teaching environmental education in an interdisciplinary manner. Case studies, family activities, community projects, field trips, clubs, and the use of a variety of written and graphic materials are included as examples. Also suggested is a method of incorporating environmental concepts into all existing State syllabuses.

*How Did We Get Here? (1972) Available on loan basis.

A 20-minute sound film in color depicting American lifestyles and their effect on the environment. A study of the attitudes of man traces some causes of environmental deterioration.

*A Better Way To Live (1973) Available on loan basis.

A color filmstrip with accompanying tape which explores alternative lifestyles and how they relate to the environment. An in-depth look into the effects of population, industry, affluence, and big business on the balance of nature.

*A Better Way To Live (1973)

A manual containing suggested discussion questions, projects, and activities that may be used with the filmstrip to enhance its effectiveness. A section on developing the single concept lesson is included.

*A Place To Be (1974) Available on loan basis.

A color filmstrip with accompanying tape which examines the urban environment. Personal adjustment to city life with its multitude of problems, and what people can do to solve them through awareness, concern, and positive action, is the central theme. Designed principally for adult education classes.

*A Place To Be (1974)

A manual containing a series of discussion questions and activities to supplement and extend the concepts presented in the filmstrip.

* †People and Cities (1974) [92 675]

An instructional manual containing well-developed lesson plans for adult education instructors who wish to present environmental education topics. It concentrates on the problems of urban living and focuses on the individuals's role in coping with them.

* †Living Within Our Means: Energy and Scarcity, K-6 (1974) [93 673]

An instructional activities manual in which all activities are integrated throughout subject areas and grade levels by means of cross-references for the regular instructional understandings and environmental understandings.

* †Living Within Our Means: Energy and Scarcity, 7-12 (1974) [101 959]

An instructional activities manual in which all activities are integrated throughout subject areas and grade levels by means of cross-references for the regular instructional understandings and environmental understandings.

*Less Is More (1975) Available on loan basis.

A color filmstrip with accompanying tape which examines the topics of money management; food and clothing purchases; and the relationships among the consumer, the environment, and the role of the automobile in today's society.

*Less Is More (1975)

A manual containing background material for lesson plan development, discussion questions, projects, and activities that may be used with the filmstrip to enhance its effectiveness. Student study guides are integrated with the background information used in developing the various lesson plans. Specifically designed for adult education classes.

*Environmental Quality: A Community Concern (1975) To be available after January 1, 1976.

A manual containing specific suggestions for designing and conducting learning activities relating to transportation, land use, energy conservation, and population growth. The materials are developed in a manner which allows them to be used in seminars, debates, or lectures.

Man Builds-Man Destroys

A set of 30 half-hour videotape programs produced by the Department's Bureau of Mass Communications and United Nations Television. An accompanying manual is also available from the Bureau.

APPENDIX G - NEW YORK CITY CURRICULUM REFERENCES

This appendix is an attempt to facilitate the use of the publication's instructional units in New York City's schools. Most of the environmental/subject matter units are referenced to the appropriate portions of the curriculum bulletins developed by the New York City Board of Education and used for the City's junior and senior high school programs. The left-hand column under each subject area contains the title of the unit, while the New York City syllabus reference is provided in the right-hand column.

Subject Area

Unit Title	*New York City Syllabus Reference*
CONSUMER EDUCATION	
Budgeting Environmentally (p. 5)	Social Studies, Grade 12: Economics; *What is the Role of the Consumer in Our Market System?*, pp. 58-63; *Budgeting*, p. 12.
Consumer Purchasing (p. 9)	Social Studies, Grade 12: Economics; *What is the Role of the Consumer in Our Market System?*, pp. 58-63. Distributive Education for High Schools; *Fair Advertising Practices*, p. 70.
ENGLISH LANGUAGE ARTS	
Man Interacts with His Environment (p. 15)	English Language Arts, Grades 5-12; *Humanistic Values*, p. 153; *Aims for Literature Lessons*, p. 161; *Creating Unified Development*, p. 165; *Lesson on Short Story*, p. 184; *Value Questions for the Teaching of Literature*, p. 234; *Interdisciplinary Organization*, p. 277.
Pollution and Propaganda (p. 19)	English Language Arts, Grades 5-12; *Critical Reading*, p. 36; *Integration of Mass Media and Literature*, pp. 297-305; *Reading in Subject Areas*, pp. 136-139; *Thematic Unit*, p. 194; *Recognizing Slanting*, p. 87; *Value Modification*, p. 88.

ENVIRONMENTAL STUDIES

Overpopulation: A Drain on Resources (p. 23)	Science, Grade 9; Unit IV: Biology - *Sexual Reproduction*, pp. 243-288 Social Studies Grade 7, American History: Historical Development of the United States; *Why People Moved to the New World*, p. 3; *How America Grew in a Changing Political Climate*, p. 8; *How American Democracy Changed in Response to the Needs of the Twentieth Century*, p. 10. Social Studies Grade 8, Urban Growth: Challenges of a Changing Society; *Case Study of the New York Metropolitan Area*, pp. 7-8; *Urbanization at Home and Abroad*, pp. 18-21; *The Changing Nature of Federalism in Urban America*, pp. 23-24. Social Studies Grade 9, World Studies: Eastern Civilization Regional Studies *People's Republic of China*, pp. 8-11; *The Subcontinent of India*, pp. 16-19; *Sub-Saharan Africa*, pp. 24-27. Social Studies Grade 11, American History (American Studies); *Who Are We? The Pluralistic Society*, pp. 6-8. Social Studies Grade 12, Economics: *Overpopulation Is the Cause of Poverty*, pp. 364-371.
Energy and Food Shortages (p. 27)	Science, Grade 9; Unit III: Earth Science - *Energy in the Solar System*, pp. 170-202; - *Man and Space*, pp. 203-215; Unit IV: Biology - *Sexual Reproduction*, pp. 243-288. Social Studies Grade 9, World Studies: Eastern Civilizations Regional Studies; *The Future of the Middle East*, p. 255. Social Studies Grade 11, American History (American Studies); *How Should Our Nation Act As A World Power: Can the United States Balance Its Desire for International Cooperation With Its Own National Interest?*, p.16; *What Are Our Responsibilities As A World Power Today?*, pp. 18-19. Social Studies Grade 12, Economics: *How Do Individuals and Society Make Economic Choices?*, pp. 5-6; *What Are The Problems of Developing Economies?*, p. 32; *Overpopulation Is The Cause of Poverty*, pp. 364-371.

FINE ARTS

Student Murals: A Constructive Answer to Graffiti (p. 33)	Major Art In The Academic High Schools; *Color and Design*, pp. 157-165.
Art, Poetry and Nature (p. 37)	Major Art In The Academic High Schools; *Drawing: Making Drawings Based on Personal Imagery*, p. 17.
Experimenting With Light and Sound To Create An Aesthetically Pleasing Environment (p. 40)	Major Art In The Academic High Schools; *Experimenting With Color*, p. 301.

HEALTH

(See references which precede each health unit in the text, pp. 43-55.)

INDUSTRIAL ARTS

Recycling Scrap Metal (p. 57)	Industrial Arts Metalworking - Secondary Schools; *Sheet Metal*, pp. 97-114; *Art Metal Jewelry - Design and Texture*, p. 120.
The Ceramics Industry: Natural Resources, Recycling, and Pollution (p. 59)	Industrial Ceramics - Secondary Schools; *Career Opportunities in the Ceramics Industry*, p. 114.
Waste Management: An Industrial Concern (p. 61)	Industrial Arts Shop Management; *Shop Management: Pupil Participation*, p. 36.
The Efficient Use and Recycling of Materials in the Industrial Arts Laboratory (p. 63)	(See State syllabus reference on p. 63.)
An Exercise in Recycling and Land Use (p. 66)	Drafting Experiences for Intermediate School Pupils; *Architectural Drawings*, p. 68.

	Graphic Arts Grades 7-8-9; *Hand Composition Activities*, pp. 9-11. Industrial Arts Woodworking - Secondary Schools; *The Group Project*, pp. 81-86. Industrial Arts Metalworking - Secondary Schools; *The Integrated Group Project*, p. 30. Industrial Ceramics - Secondary Schools; *Cement-Making*, pp. 78-82.
Better Utilization of Forests and Wood Products (p. 69)	Industrial Arts Woodworking - Secondary Schools; *Cutting - Planer*, p. 10; *Cutting - Jointer*, p. 17; *Wood - Its Selection, Growth, and Identification*, p. 33; *A Turned Bowl*, p. 52.

MATHEMATICS

(See references which precede each mathematics unit in the text, pp. 73-76.)

SCIENCE

Sponge Simulation Activity: Interdependence (p. 77)	Science, Grade 7; Unit III: Biology - *Cells*, pp. 10-17.
Dead as a Dodo (p. 81)	Science, Grade 7; Unit IV: Earth Science - *Why Did Pre-Historic Animals Die Out?*, p. 270; *Many Plants and Animals Did Not Survive from One Era to Another*, p. 285.
Waste Removal (p. 86)	Science, Grade 8; Unit I: Chemistry - *How Can Water Be Purified?*, pp. 54-55. Science, Grade 9: Unit II: Chemistry - *What Are the Causes of Water Pollution?*, pp. 133-134.
Energy Loss (p. 88)	Science, Grade 7; Unit II: Physics - *How Can We Move Heat?*, pp. 147-149. Science, Grade 8; Unit II: Physics - *What Happens to Energy After It Is Used?*. pp. 105-107.

Combating the Energy Shortage (p. 90)	Science, Grade 8; Unit II: Physics - *Can Energy Be Created?*, pp. 109-11. Science, Grade 9; Unit III: Earth Science - *How Does the Sun Affect Us on Earth?*, pp. 160-161.
The Role of Trees in Our Environment (p. 92)	Science, Grade 7; Unit III: Biology - *How Do Green Plants Synthesize Nutrients?*, pp. 30-31.
Bugs in Our Biosphere (p. 97)	Science, Grade 9; Unit IV: Biology - *How Do Some Insects Develop?*, p. 265.
Planned Land Use (p. 101)	Science, Grade 8; Unit I: Chemistry - *What Causes Air Pollution and What Can We Do About It?*, pp. 86-87. Science, Grade 9; Unit II: Chemistry - *What Are the Causes of Water Pollution?*, pp. 133-134.
Material Cycles (p. 104)	Science, Grade 7; Unit III: Biology - *How Do Green Plants Synthesize Nutrients?*, pp. 30-31.
Recycling Laboratory Glassware (p. 106)	(See references for this unit in the text.)
Wildlife Habitats (p. 108)	(See references for this unit in the text.)
Wildlife Management (p. 110)	(See references for this unit in the text.)
Air Pollution Activities for the Unaware and Unconcerned (p. 113)	Science, Grade 8; Unit I: Chemistry - *Air Pollution*, pp. 82-88.
Energy by Fission (p. 118)	(See references for this unit in the text.)

SOCIAL STUDIES

Early Human Settlements and the Environment (p. 121)	Social Studies Grade 7, American History: Historical Development of the United States; *Why People Moved to the New World*, pp. 19-21; *How Permanent Settlements Were Formed in the New World*, pp. 31-44;

	How America Grew in a Changing Political Climate, pp. 62-83; *How American Democracy Changed in Response to the Needs of the Twentieth Century*, pp. 121-131. Social Studies Grade 10, World Studies; Western Civilization - History and Culture; *The Industrial Revolution*, pp. 111-150. Social Studies Grade 11, American History: American Studies *Who Are We? The Pluralistic Society*, pp. 6-7; *How Do We Live Together: Social and Cultural Development of Our Nation*, pp. 201-214.
Native Americans and the Environment (p. 123)	Social Studies Grade 11, American History: American Studies; *Who Are We? The Pluralistic Society*, pp. 6-7; *How Do We Live Together: Social and Cultural Development of Our Nation*, pp. 201-214.
Air Pollution (p. 126)	Social Studies Grade 8, Urban Growth: Challenges of a Changing Society; *Serious Problems*, pp. 9-10; *Urbanization in New York State*, pp. 13-20; *Changing Nature of Federalism in Urban America*, p. 23; *Urbanization at Home and Abroad*, pp. 159-166.
Psychology of Graffiti (p. 129)	Social Studies Grade 8, Urban Growth: Challenges of a Changing Society; *Case Study of the New York Metropolitan Area*, pp. 4-12, 27-119.
An Environmental Bill of Rights (p. 132)	Social Studies Grade 11, American History: American Studies; *What are the Civil Liberties and Duties of an Individual in Our Democracy*, pp. 95-109.
Environmental Impact of Westward Expansion (p. 134)	Social Studies Grade 7, American: Historical Development of the United States; *The Frontier*, p. 62.
Parks and Open Space (p. 136)	Social Studies Grade 8, Urban Growth: Challenges of a Changing Society; *Case Study of the New York Metropolitan Area*, pp. 4-12, 27-119.

An Evaluation of a Neighborhood Environment (p. 140)	Social Studies Grade 8, Urban Growth: Challenges of a Changing Society; *Case Study of the New York Metropolitan Area*, pp. 4-12, 27-119.
World Population Growth vs. Rate of Food Production (p. 143)	(Same as for the Environmental Studies unit, Overpopulation: A Drain on Resources, referenced on p. 218)
Inefficient Use of Resources (p. 148)	Social Studies Grade 12, Economics; *How Do Individuals and Society Make Economic Choices?*, p. 41; *Organizing Production to Satisfy Economic Choices*, pp. 73-86; *Why Is the United States Concerned With Problems of the Developing Nations?*, pp. 363-372.
The Power of Petroleum (p. 151)	Social Studies Grade 9, World Studies: Eastern Civilizations Regional Studies; *The Future of the Middle East*, p. 255. Social Studies Grade 12, Economics; *How Do Societies Make Economic Choices?*, p. 5; *Rational Analysis in Economics*, p. 6; *What is the Nature and Function of the American Economic System?*, p. 6; *How Does Price Act As a Regulator in the Market System?*, p. 6; *How Does the Market System Make Man Inderdependent?*, p. 7.
India (p. 154)	Social Studies Grade 9, World Studies: Eastern Civilizations Regional Studies; *The Sub-Continent of India*, pp. 186-226.
Endangered Species (p. 157)	Social Studies Grade 9, World Studies: Eastern Civilizations Regional Studies; *Wild Animals in Africa Are Fast Disappearing*, p. 262.
Priorities for Developing Nations (p. 160)	Social Studies Grade 9, World Studies: Eastern Civilizations Regional Studies; *How Do Climate and Topography Influence Population Distribution in the (Indian) Subcontinent?*, pp. 190-193; *The Process of Industrialization (in India)*, p. 209; *The Industrializing Elites and Their Strategies*, pp. 211-213; *Economic Planning in India*, pp. 214-224.

Citizen Involvement in Land Use Planning (p. 165)	Social Studies Grade 8, Urban Growth: Challenge of a Changing Society; *Rehabilitation*, pp. 58-73; *Megalopolis and Its Spread*, pp. 50-53; *Problems of Coping with Air and Water Pollution*, pp. 159-171. Social Studies Grade 12, Economics: *Economics of the Metropolitan Region*, pp. 260-268.
Community Populations and the Environment (p. 169)	Social Studies Grade 8, Urban Growth: Challenges of a Changing Society; *The Urban Trend*, pp. 178-179. Social Studies Grade 12, Economics; *Changing Population of the United States Cities and Suburbs*, pp. 266-267.
Community Attitudes and the Environment (p. 172)	Social Studies Grade 8, Urban Growth: Challenges of a Changing Society; *Cities as Third Partner in the Federal System*, pp. 284-327.
Population and Gross National Product (p. 174)	Social Studies Grade 12, Economics; *Organizing Production to Satisfy Economic Choices*, p. 73; *Labor Characteristics of Population*, p. 78; *How We Try to Maintain a Stable and Growing Economy*, pp. 18-22; *New York City's Economic Problems*, p. 24; *International Economic Problems*, p. 36.

GENERAL UNITS

(There are no specific syllabus references for these units.)

APPENDIX H - GENERAL INDEXES AND SUBJECT HEADINGS

GENERAL INDEXES

The following general indexes are extremely valuable sources for many types of materials on the environment. Through these indexes, teachers and students will find periodical and newspaper articles, government documents, research reports, curricula, bibliographies, audiovisual materials, sources of free and inexpensive materials, and countless other items of interest. Most of these indexes are readily accessible in school or public libraries.

Applied Science and Technology Index

Education Index
Educational Resources Information Center (ERIC) Research in Education
Educator Guide to Free Films
Educator's Guide to Free Filmstrips
Educator's Guide to Free Health, Physical Education & Recreation Materials
Educator's Guide to Free Science Materials
Educator's Guide to Social Studies Materials
Elementary Teacher's Guide to Free Curriculum Materials
El-Hi Textbooks in Print
Essay and General Literature Index

Facts on File
Free and Inexpensive Learning Materials

Guides to Educational Media

Monthly Catalog and United States Government Publications

New York Times Index
NICEM Index to Ecology (Multimedia)
NICEM Index to Educational Audio Tapes
NICEM Index to 8 mm Motion Picture Cartridges
NICEM Index to Overhead Transparencies
NICEM Index to 16 mm Educational Films
NICEM Index to 35 mm Educational Filmstrips

SUBJECT HEADINGS

Environmental education encompasses many issues, topics, and areas of study. Often a specific issue or topic will focus a teacher's or a student's interest more effectively than a general subject or area of study does. The facsimiles of subject cards which appear on the following pages constitute a list of environmental subject headings which is provided with the hope that those using this guide will not be limited in their search for resources for want of a suitable range of topics. Yet the list, while extensive, can never be complete inasmuch as new relationships between environment and other fields are constantly being realized.

1.

ENVIRONMENTAL EDUCATION
see also

Adaptation (Biology)
Aeroplanes. Noise
Air. Pollution (or Air pollution)
Air purification
Atomic energy
Atomic power
Atomic power industry
Atomic research
Automobile exhaust gas
Automobiles
Automobiles. Engines

2.

Birth control
Cities and towns. Growth
Cities and towns. Planning
City noise
Cleaning compounds
Coal mines and mining
Coal research
Community development
Conservation
Conservation education
Conservation of energy
Conservation of natural resources (or: .... of resources)
Detergent pollution

3.

Diesel engines
Disinfection and disinfectants
Dust
Ecology
Economics
Electric power
Electric utilities
Electric vehicles
Electricity
Energy crisis

Energy crisis and the environmental movement
Energy crisis. U.S. foreign policy
Energy crisis. Sources (of information)

4.

Environment
Environmental .... For example: Environmental health, policy, education, etc.
Factory and trade waste
Forests and forestry
Fuel
Fuel research
Fuel resources
Gas, industry
Gas, natural
Gas, manufacture and works
Gas supply
Gasoline
Gasoline industry

5.

Geothermal energy
Human ecology
Hydroelectric plants
Hydrogen
Hydrogen, liquid
Hygiene. Public
Industry and state
Industry and the environmental movement
Insecticides
Insulation
International Atomic Energy Agency
Jet planes. Noise
Man. Influence of environment
Man. Influence on nature

6.

Marine pollution
Marine resources
Mines and mineral resources

Natural resources (with subdivisions)
Nature conservation
Noise (with subdivision - example: Noise. Physiological effect.)

7.

Noise control
Nuclear fuels
Nuclear fusion
Nuclear reactors
Odor control
Oil lands
Oil pollution of rivers, harbors, etc.
Organization of petroleum exporting countries
Pesticides
Pesticides and the environment
Petroleum
Petroleum industry
Petroleum refineries
Petroleum supply

8.

Pollution
Population
Power resources
Radioactive fallout
Radioactive pollution (or contamination) of water; the sea; the atmosphere
Radioactive waste disposal in rivers, lakes, etc.
Radioecology
Reclamation of land
Refuse and refuse disposal
Sanitary engineering
Sanitation
Sewage engineering
Slums

9.

Smog
Smoke
Soil Conservation

Soil erosion
Soil exhaustion
Soil pollution

10.

Solar energy
Solar furnaces
Solar heating
Spraying and dusting residues in agriculture
Strip mining
Thermal pollution of rivers, lakes, etc.
Traffic noise
Waste disposal in the ocean
Water. Pollution (or: Water pollution)
Water. Purification (or: Water purification)
Water conservation
Water quality
Water resources development
Water - supply

11.

Wildlife. Conservation
Wind power

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